SEPTEMBER 26, 1955

NEWS ISSUE

Electrical World

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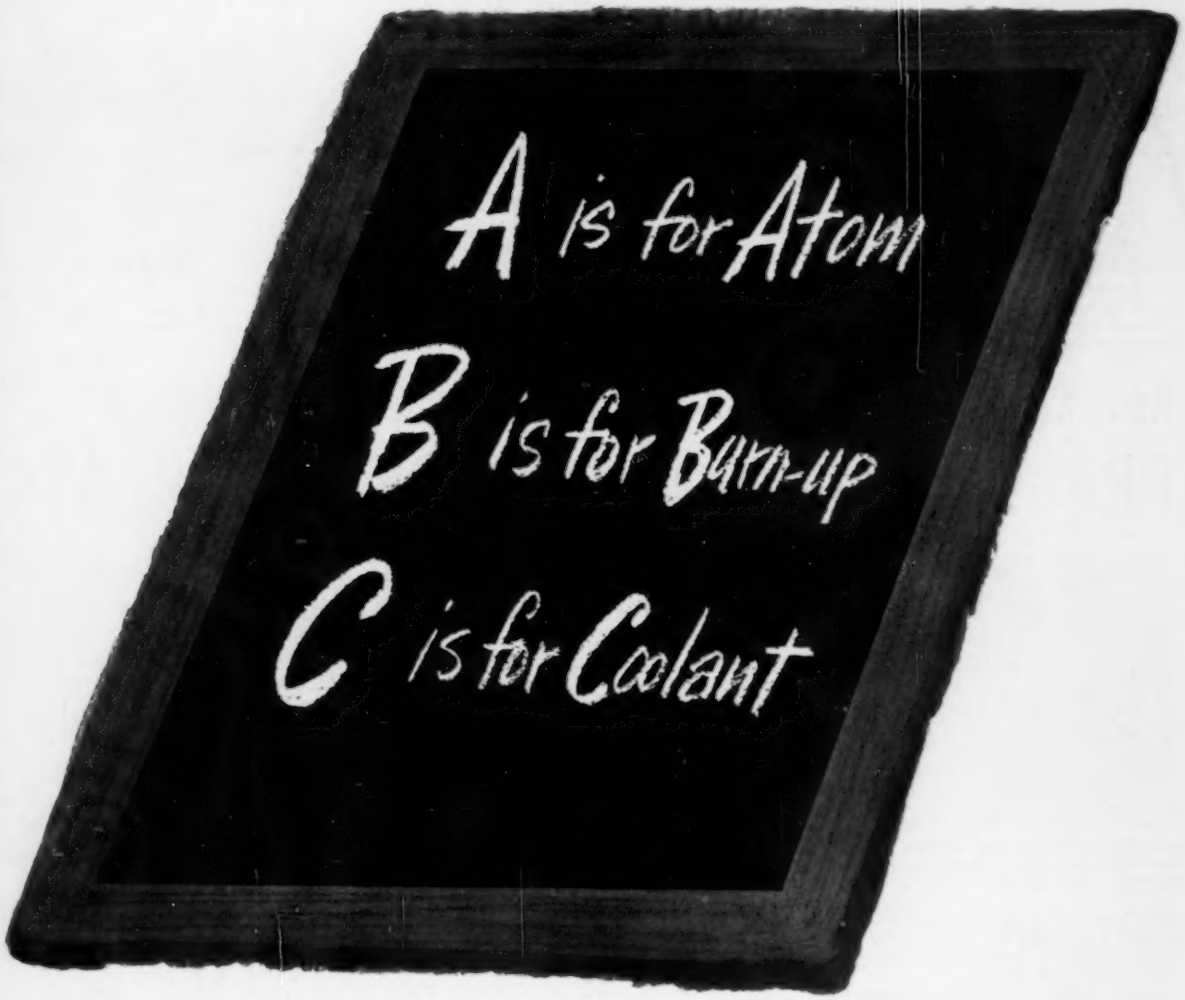

Glossary Defines Nuclear Terms

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Depots Speed 187-Mile Line

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BUSINESS OUTLOOK

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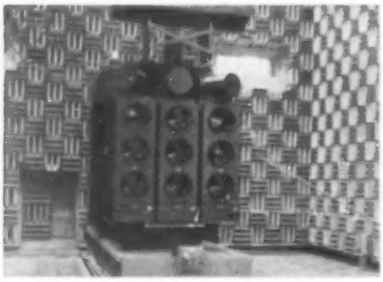
E B POWER GS W 12
UNIVERSITY MICROFILMS IN
313 N 1 ST
ANN ARBOR MICH

FIRST USE OF A HIGH-DIELECTRIC GAS for power transformer insulation, which foretells eventual displacement of oil- and askarel-filled designs, is discussed here by J. W. Seaman (right), General Manager, and J. W. Butler, Manager—Marketing of General Electric's Power Transformer Department.

UPRIGHT SHIPMENT OF ALL POWER TRANSFORMERS from G.E.'s Pittsfield, Mass., plant this last year highlights the successful efforts of G-E engineers to keep designs compact, making installation simpler, faster, less costly. Above, transformer and all accessories are shipped on same car.

Recent advances in power transformers spotlight

PROGRESS IN REDUCING SYSTEM COSTS



FULL-TIME OPERATION OF G.E.'S SOUND LAB is speeding the design of quieter transformers, permitting their installation closer to homes.

FASTER DESIGNS, GREATER ACCURACY are results of card programmed calculator checked here by Analytical Engr. E. Magnusson and L. Wetherill, Mgr.—Power Trans. Engrg.

Gas for insulation and cooling suggests direct operating savings, new reduction of noise problem

One of the most radical developments in power transformers, the practical application of sulfur hexafluoride for insulation and cooling, holds considerable promise for helping electric utilities meet the need for higher-voltage units at lower expenditures per kva.

NEW TRANSFORMERS

As a result of more than two years of prototype development, two 2000-kva, 69-kv transformers are nearing completion at General Electric's Power Transformer Department in Pittsfield, Mass. Following field test experience in cooperation with Consolidated Edison of New York, the new gas-filled design may well be extended to much higher ratings with consequently greater savings in store for the furure.

For the electric utility industry, the new transformer design will offer attractive economies through improvements in safety, sound, and lightness. The oil hazard has been removed, transformers can be more easily installed, and, perhaps most important, they can be installed closer to load without creating undue acoustic disturbances.

Like the rapid acceptance of upright transformer shipments and the advances in noise reduction forecast by full-time operation of G.E.'s Transformer Sound Laboratory, gas-filled transformers mark another example of the significant progress that General Electric engineers, working in co-operation with the utility industry, have made toward improving system operation and lowering system investments. For more information contact your G-E Apparatus Sales Representative. General Electric Co., Schenectady 5, N. Y. 501-208

More Power to America

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Electrical World

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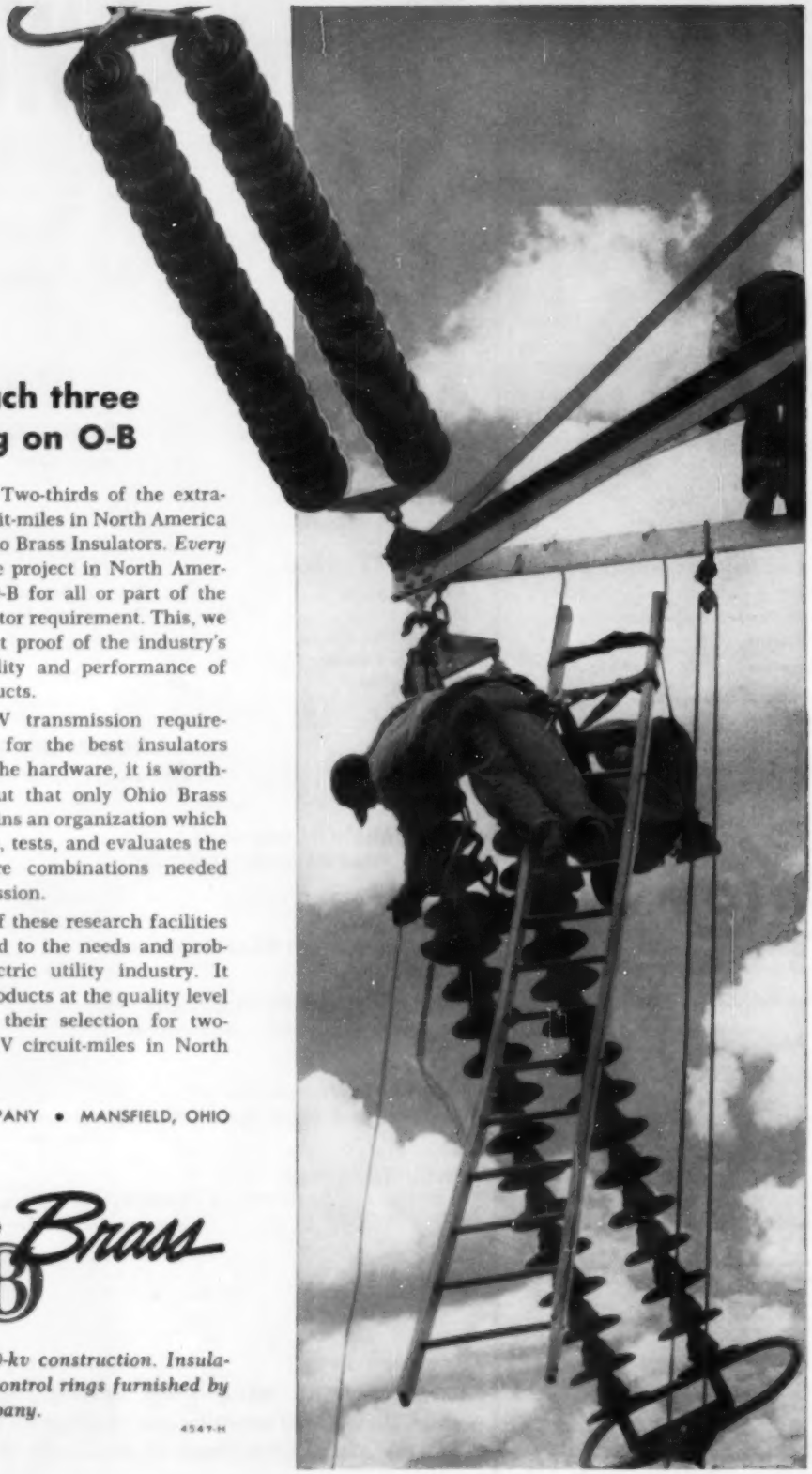
COMING NEXT WEEK—Street lighting, light's forgotten child, gets special attention in a 16-page study which points out the many advantages of promoting this load.



two of each three are strung on O-B

Miles, that is! Two-thirds of the extra-high voltage circuit-miles in North America are strung on Ohio Brass Insulators. *Every* extra-high voltage project in North America has chosen O-B for all or part of the suspension insulator requirement. This, we think, is excellent proof of the industry's faith in the quality and performance of Ohio Brass products.

Since the EHV transmission requirements that call for the best insulators apply equally to the hardware, it is worthwhile to point out that only Ohio Brass Company maintains an organization which designs, produces, tests, and evaluates the insulator-hardware combinations needed for EHV transmission.

Constant use of these research facilities keeps O-B attuned to the needs and problems of the electric utility industry. It also keeps O-B products at the quality level that encouraged their selection for two-thirds of the EHV circuit-miles in North America!

OHIO BRASS COMPANY • MANSFIELD, OHIO

Ohio Brass

Deadends on 330-kv construction. Insulators, yokes, and control rings furnished by Ohio Brass Company.

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EDITORIALS

This Nuclear Language

The rise of atomic power has brought with it a new language, a lexicon that engineering graduates a decade ago never even heard, let alone understood. Even now some of us are having trouble with such atomic terms as barn, isobar, nuclide, reactivity, scram, and the like.

Today these words and this new language can be a bridge or a barrier to the understanding of atomic power, depending on how fast and how thoroughly their meanings are absorbed into the vocabulary of working engineers.

Growing as it did out of nuclear physics, it is understandable that the jargon of atomic technology is strikingly strange to most engineers. Many of the phenomena in the new art are being encountered for the first time. To explain them, physicists turn naturally to the semantics of pure science. At times even this doesn't provide the answer; so entirely new words and meanings are created.

Today atomics is moving forward rapidly into the practical field of power. Here engineers have much technical knowhow to contribute from accumulated experience, if they and their atomic colleagues can make themselves mutually understood. For many of their problems—like those involved in the area of fluid flow, heat transfer, and thermodynamics—have a long history in engineering and a jargon as unfamiliar to the atomic scientist as his is to the engineer.

A major step in the promotion of better understanding has been taken jointly by the National Research Council and the American Society of Mechanical Engineers in publishing recently as a Proposed American Standard a "Glossary of Terms in Nuclear Science and Technology."

In this issue (page 18) with the permission of the National Research Council, Electrical World has reproduced from this new 200-page book a few of the hundreds of terms that this glossary contains that are particularly pertinent to atomic power technology.

NRC, ASME and participating learned societies and agencies of government are to be commended. It is from such joint professional efforts that atomic technology will move ahead over a carefully constructed language bridge linking new technology with old.

Permit Government to "Buy American"

It should be possible for the United States government to choose its own suppliers of heavy goods without raising an international ruckus. Yet everytime the low bid of a foreign firm is passed over, formal protests are lodged with our State Department. The British Foreign Office is wont to express "grave concern," and the White House is called in for consultation.

Latest case in point came over the award of a $6.9-million contract for electrical equipment to two domestic firms although a British firm had offered a lower price (EW, Sept. 5, p 67). The official reason for keeping the award in this country was that it would help alleviate conditions in an area of substantial unemployment. This is certainly good and sufficient reason, and one of the few acceptable under the present interpretation of the "Buy American" law.

But, as might have been expected, this reason did not deter foreign governments from raising a stir about the award. There were cries of squeezing out the foreign firms, restraint of world trade, and detour of the Eisenhower Administration's announced policies.

In this connection the recent suggestion of Commerce Secretary Sinclair Weeks appears to have considerable merit. Weeks believes it should be possible to determine in advance whether a contract is going to be awarded to an American firm on permissible grounds such as unemployment. Where such a determination is made, Weeks suggests that foreign firms would not be invited to enter bids.

Such a procedure would save foreign firms the expense and trouble of preparing bids on contracts which are marked in advance for the American market. It would also save the Administration the embarrassment of turning down low foreign bids where the "Buy American" law is to be brought into play.

By following Weeks's suggestion, the U. S. government might prevent the ruckus which accompanies the award of contracts to American manufacturers.

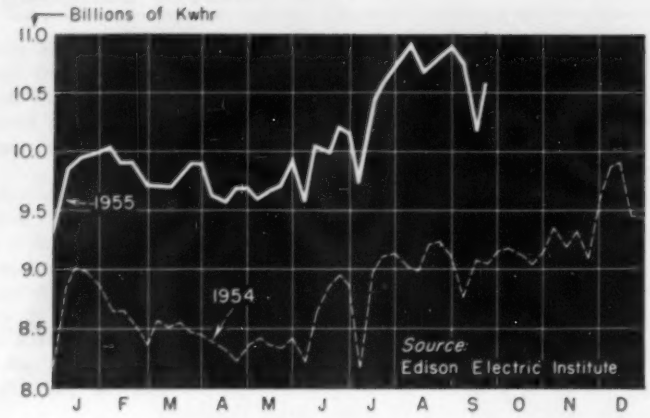
"Too Many Gas Men . . ."

A brief letter from a reader can often speak much more forcefully and more eloquently than an editorial. We received such a letter last week:

"I would like to add a word of comment on and reinforcement of the observations of E. T. Hughes in the Aug. 29 issue (p 32) of the Electrical World, under the heading 'Too Many Gas Men in Our Industry.'

What the electric utility industry needs most is not so much younger men who will strive to remove "Gas" from the corporate name as from the corporate head and the corporate spirit. The electric utility industry needs aggressive men who believe in the electric utility industry and in the benefits to be derived by the country as a whole, by the customer, and by the electric utility from more extensive and intensive use of electric energy and its preferential use against other forms of energy. It needs more people who truly believe in the simple idea that "There Is No Living Like Electric Living."

Philip Sporn
President, American Gas & Electric Co.



OUTPUT

Week Ended Sept. 17
10,580,000,000 Kwhr
Up 16.6%

Atomic Energy Commission requirements — 985,000,000 kwhr (Electrical World estimate). Excluding AEC, output increase was 11.3%

Per Cent Change From Previous Year

	Total US	New Eng.	Mid. Atlan.	Cent. Ind.	West Cent.	South-east	South Cent.	Rocky Mount.	Pacific NW	Pacific SW
Sept. 17	+16.6	+10.6	+8.4	+27.8	+9.7	+18.2	+10.4	+21.6	+12.2	+14.8
Sept. 10	+15.3	+8.6	+6.3	+26.0	+5.0	+21.0	+1.6	+20.1	+12.8	+17.4
Sept. 3	+17.8	+21.7	+11.7	+28.4	+5.9	+23.0	+3.9	+20.4	+15.9	+13.5

Seasonally Adjusted Index 201.0 Week Ago 201.5 Year Ago 172.0

The Issue's Highlights—Chudoff's House subcommittee ends cross-country probe into Administration's power policies after three-day session in San Francisco. . . A-C, GE, and Westinghouse up electrical equipment prices. . . ODM temporarily restores power goal for fast tax write-offs. . . Idaho Power revises plans, speeds schedule for Snake River development. . . Proposed Washington Water Power-Puget Sound P&L merger is first target of Senate antitrust and monopoly subcommittee investigation of utility mergers. . . IUE-CIO ends Westinghouse strike. . . New York's Governor Harriman authorizes state transmission line for St. Lawrence power.

Industrial Relations Conference—Harllee Branch, Jr, president of EEI and Georgia Power, last week urged utilities at EEI's Industrial Relations Round Table Conference to take more interest in colleges and universities. He said it was largely the fault of management that the industry "has not made itself look attractive enough as a place of employment to young men of energy and imagination". . . N. Bernard Gussett, president of Iowa P&L, urged members to buy stock in their own companies. "It is the best interest-getter in profits that I know," he added. . . John W. Evers, president of Commonwealth Edison, told meeting there is a way "to test the sincerity of a person—or a company—that talks a good industrial and public relations program. Just look beyond the words to see what actually is being done to make employees and customers satisfied."

PEA Elects New Officers—Pennsylvania Electric Association at its annual meeting last week elected Orville E. Flora, secretary and treasurer, Pennsylvania Power, president for the coming year. He succeeds Theodore O. McQuiston, vice president of Metropolitan Edison. Vice Presidents are: Robert P. Liversidge, vice president, Philadelphia Electric; Joseph O. Chambers, vice president West Penn Power; and (newly elected) George M. Keenan, vice president, Pennsylvania P&L.

Atomic Power—Ebasco Services will shortly announce the establishment of a Nuclear Engineering Division. . . Yankee Atomic Electric's Pres William Webster told SEC its revised proposal to AEC for nuclear power plant calls for 134,000 kw capacity instead of 100,000 kw, and estimated cost of $33.4 million instead of $24 million. Proposed rates to YAEC member utilities, he said, would be annual capacity charge of $30 per kw plus a 3.5-mill energy charge. . . Team of Columbia University scientists reports it has devised a method of obtaining the large quantities of heavy nitrogen that may be needed to operate breeder reactors.

NEWS OF THE INDUSTRY BRIEFLY TOLD

Off the Washington Wire—AEC has issued its second invitation to industry for proposals to build and operate nuclear power reactors with government help. Invitation is for reactors in the 5,000 to 40,000-kw bracket. . . Atomic Industrial Forum's third annual meeting and first U.S. Atomic Trade Fair opened in Washington this week. . . Rep James T. Patterson (R-Conn.,) has asked President Eisenhower to barter surplus American farm products for Chilean copper. He also suggested U.S. buy copper on world market for resale to copper-short American fabricators.

Meeting of Virginias Association—Public Utilities Association of the Virginias at its annual meeting in White Sulphur Springs elected D. B. Potter, administrative vice president, Monongahela Power Co, president. . . Virginia State Corporation Chairman H. Lester Hooker told meeting success of utility regulation in U. S. has been strong factor in keeping utility industry as part of free enterprise system. "Other countries for most part have not succeeded in doing this". . . Francis X. Welch, editor, Public Utilities Fortnightly, said "Without commission regulation we would not have this high degree of development and successful physical operation that American utilities now enjoy. Take away or destroy this peculiarly American system of commission regulation—(and) we would have government monopoly."

Labor—Florida P&L and IBEW-AFL have agreed on new contract settlement including overall wage increase of 5%. Contract is subject to ratification by local unions. . . UWUA-CIO members of Pennsylvania Power went on strike last week over contract disagreements.

Tennessee—TVA Chairman Gen Herbert D. Vogel told group in Gatlinburg that he had been given assurance that Congress would act early next year on proposal to permit TVA to become a self-financing agency. . . Former Memphis Mayor Watkins Overton has touched off speculation about possible revival of Dixon-Yates power contract by opposing plans for proposed $100-million municipal power plant as too large.

Regulation and Legislation—Jacksonville, Fla., City Council is considering ordinance to reimpose 10% municipal sales tax on utilities bills. . . Rhode Island Utility Administrator Kennelly has initiated inquiry into fuel charge tariffs and taxation practices of state's electric and gas utilities. . . Wyoming Rural Electrification Association has protested failure of 1955 state legislature to extend property tax exemption for co-ops.

ABOUT PEOPLE IN THE INDUSTRY

The United States faces "an era of tremendous expansion," Chairman Horace P. Liversidge of Philadelphia Electric last week told the Pennsylvania Electric Association. "No matter how high we raise our sights, they will probably be too low. . . We still cannot grasp the great impact that nuclear power will have on our social and economic life." By 1980, he added, "our company's total investment in utility plant may well reach $2.5 billion, compared with our present plant investment of $800 million."

Thomas G. Dignan, president of Boston Edison Co, has been elected chairman of the finance group of the Electric Companies Advertising Program. He succeeds Charles P. Crane, president and chairman of Baltimore Gas & Electric Co, who had held the position for three years. The ECAP finance group has responsibility for handling all financial matters, including budgets, and it also is in charge of all matters relating to membership. It is composed of about 20 top executives from the utility industry.

More News About People page 36

Rep Chudoff's Unit Ends Power Probe in Field

- **Political bickering sparks three-day San Francisco session**
- **Jonas criticizes conduct of hearings as one-sided, unfair**
- **Interior witnesses will be heard in Washington next month**

REP CHARLES R. JONAS

Three stormy days of hearings in San Francisco recently ended the cross-country search for campaign issues pursued by Rep Earl Chudoff (D-Pa.) and his House subcommittee on public works and resources (EW Sept. 5, p 60; Sept. 12, p 8; Sept. 19, p 108).

From Atlanta to San Francisco, Republican members of the subcommittee insisted that the hearings were unfair because the accused—usually the Interior Department—was not permitted to defend itself. The subcommittee is a unit of the House of Representatives' Government Operations Committee.

For months before it took to the road, the subcommittee had been busy in Washington, D. C., probing the Administration's power policy. It became apparent that the unit was after issues with which the Democrats could spark their 1956 Presidential campaign (EW, June 13, p 66).

Probe to Cease in October

Now Chudoff has announced that his subcommittee would cease its power probe in mid-October after representatives of the Interior Department have been heard in Washington, D. C.

During the subcommittee's road show, Rep Charles Jonas (R-N.C.) repeatedly criticized the manner in which the hearings were conducted. In San Francisco, he declared, "In my opinion there has been a planned purpose on the part of this committee to hold hearings, ostensibly to investigate a department of government, in which only one side has been allowed to be heard."

"I don't think the committee has been very fair," he added. "There has been no effort on the part of the staff to get the Administration's views."

For this reason, he declared, minority members at times had a right to be exasperated.

The hearings, particularly those in San Francisco, often turned into political bickering so noticeable the San Francisco Chronicle and San Francisco News criticized them as "sorry performances."

Hearings Were Slanted

The Democrats obviously were loading the hearings with witnesses in the hope of indicating the Interior Department is following a practice of turning to private sources government-developed power which should go to public agencies.

Witnesses included cooperatives and public agencies. At the San Francisco hearings representatives of cities receiving wholesale power from Pacific Gas & Electric Co for operation of their distribution systems complained about a proposed 28-to-31% rate increase. They contended that PG&E has them "over a barrel" because the Central Valley Project no longer is a competitor to PG&E.

Information was given to the committee that there is no more CVP power available to preference customers. Spokesmen for the cities said when CVP power was available this was used by them as a lever in negotiating cheaper rates with PG&E.

Democratic members of the committee tried to show there was something "sinister" in delivering to the Interior Department a document listing recommendations of western utilities for changes in the government's regulations regarding construction of private lines over government lands.

Herman C. Kruse, Washington representative for PG&E, said he delivered the statement to Clarence Davis, then solicitor in the Department and now undersecretary of Interior. Robert H. Gerdes, executive vice president of PG&E, volunteered the information that the document was prepared in the office of Idaho Power Co and that some 14 western utilities cooperated in drawing up the recommendations.

"We shall continue to urge the adoption of laws and regulations which we believe to be right," Gerdes told the committee, "and we trust that it will never be considered improper or unwise for a government official to agree with us."

Reclamation Bureau Defended

The Colorado River Commission of Nevada was forced to defend its dealings with the Bureau of Reclamation for 33,000 kw of Central Valley Project power.

The contract was first negotiated in 1952 and renewed each year since, although no deliveries have been made. Another renewal is anticipated. A. J. Shaver, chief engineer for Nevada Colorado River Commission, said Nevada is unwilling to give up its hold on the power. He said he hopes some day to work out an arrangement whereby it can be wheeled to Nevada over private company power lines.

Democratic members of the committee said the power, while being unused by Nevada, is going to PG&E.

Chudoff suggested that it be relinquished by Nevada to make it available to cities in California faced with a power rate increase from PG&E.

Equipment Prices Upped

. . . by A-C, GE, Westinghouse; 10% rise emerging as pattern; recent increases in labor and material costs cited as reason

Price increases on certain power equipment, all effective last week, have been announced by three large manufacturers. Recent rises in material and labor costs have been cited as the reason for the boost.

Allis-Chalmers Mfg Co—J. W. McMullen, vice president and general manager in charge of the Power Equipment Division, stated that increases of approximately 10% were made on steam and hydraulic turbine-generators, power and network transformers, unit substations, feeder voltage regulators, circuit breakers and switchgear, motors and generators, and heat transfer and water conditioning equipment.

General Electric Co—Recent action by certain departments indicates an average of 10% price increase on their individual products.

W. S. Ginn, general manager of the Transformer Division, stated that prices of transformers and related apparatus manufactured by the Power and Distribution Transformer Department have been increased approximately 10%. In addition, the price policy on above items was changed to: Price in effect at time of shipment with a 10% ceiling for normal deliveries.

Apparatus exempted from the rise in price and change in price policy are pole type distribution transformers, lightning arresters, and certain lines of feeder voltage regulators.

In addition, the GE Turbine Division announced steam turbine-generator prices have been increased about 10%. A Division spokesman said that this is the first general price increase on the steam units since March, 1953. Increases in cost of material and labor (including three wage increases) since that time have been absorbed by the company.

A 10% price increase is in effect at GE on rewinding and reconditioning of motors up to 500 hp. A 5% increase on fractional horsepower motors, except KSP-51 shaded pole motors, will be in effect Oct. 3.

Westinghouse Electric Corp—An average 10% increase is in effect on turbine-generators, switchgear, circuit breakers, power and network transformers, single-phase distribution transformers 168 kva and above, all feeder voltage regulators both step and induction type, current limiting reactors, and all instrument transformers. Price policy on all but instrument transformers is: Price at time of shipment with a 10% ceiling for normal deliveries. Not subject to the price increase or policy change are single-phase distribution transformers up to 167 kva.

Idaho Power Revises Plans for Snake River

Idaho Power Co has speeded up its planned construction schedule on two of the three dams it will build on the Snake River. It has also asked permission to make a change in building materials.

The license the Federal Power Commission granted Idaho Power specified that construction of the largest dam, 360,000-kw Brownlee, be started within a year, and that the next, Oxbow, be initiated within four years.

Idaho Power now plans to build both these simultaneously, immediately upon receiving FPC approval of its final designs.

These designs now call for impervious clay-cored rockfill dams, instead of the concrete-faced structures recommended by FPC's San Francisco office and approved by the Commission. Whether or not Idaho Power will build both dams at once if FPC doesn't approve the new design is not known.

T. E. Roach, president of the utility, said the decision to build Brownlee and Oxbow projects simultaneously and as rapidly as possible is dictated by "the imperative need for additional low-cost kilowatts in the . . . area."

CHAIRMAN LIVERSIDGE (C), PRESIDENT RINCLIFFE (1) RECEIVE AWARD

C of C Honors Philadelphia Electric

Philadelphia Electric Co was honored last week for its "many contributions to the economic and business progress" of the Philadelphia region by the Chamber of Commerce of Greater Philadelphia.

Chairman Horace P. Liversidge and President R. G. Rincliffe of Philadelphia Electric were presented a silver plaque by Walter P. Miller, Jr, Chamber president (above right).

The utility was cited for its "consistent, colorful, and long-continued advertising campaign in leading magazines and newspapers calling worldwide attention to the advantages of this area" and attracting "many industries" and "many people."

Senate Unit Probes Mergers

. . . of electric utilities as Senator O'Mahoney opens hearings; Puget Sound P&L-Washington Water Power proposal is first up

Vote-minded Senate anti-trusters whipped into their fall round of investigations last week with a frontal attack on mergers and proposed mergers of electric utilities.

Sen Joseph C. O'Mahoney (D-Wyo.) kicked off the first probe. It involves the proposed merger of Washington Water Power Co, Spokane, and Puget Sound Power & Light Co, Seattle. Under scrutiny will be the parts played in the proxy fight by Ebasco Services, Inc, Electric Bond & Share Co, and a number of New York securities houses. These are: Georgeson & Co; Abraham & Co; Kidder, Peabody & Co; Blyth & Co; Halsey, Stuart & Co; White Weld & Co, and Union Securities Corp.

O'Mahoney's hearings began last Wednesday. He presided as chairman of the Senate judiciary anti-monopoly subcommittee headed last year by public-power minded Republican William Langer (N. D.). The current hearings will be followed by a combined Judiciary-Interior Committee probe of Administration power policies, including partnership plans, and supply and distribution practices. O'Mahoney will also head this show in his capacity as acting chairman of the Interior Committee.

An interesting sidelight on these hearings is this: In the case of the current investigation, O'Mahoney heads both units purely through sufferance of the actual committee chairmen — Harley Kilgore (D-W. Va.) of Judiciary and James Murray (D-Mont.) of Interior. O'Mahoney has had his say in staffing these groups, but his has not been the power under the time-honored patronage system to hand pick his own investigators. Kilgore and Murray have done that.

So O'Mahoney is combining the talents of Murray's Interior staffers—who are more sympathetic to O'Mahoney's federal power goals—with the authority of the Judiciary Committee to probe around in the financial world.

Westinghouse Strikes End

Operations at Westinghouse Electric Corp's plants were rolling along smoothly last week after a month and a half of labor troubles including a three-day strike affecting 27 plants in nine states.

Even the company's East Pittsburgh plant, where all the trouble began, was operating with almost a full complement for the first time since Aug. 8 when 2,200 day workers stalked out on strike.

The striking workers were members of Local 601, International Union of Electrical Workers, C.I.O. Their strike had been called to protest time studies which the company had begun for day-worker jobs. The local dispute mushroomed, and in mid-September 43,000 Westinghouse workers walked out in sympathy with Local 601.

The strike, affecting 27 plants, remained in effect for three days before the "sympathetic" strikers agreed to return to work. Disgruntled members of 601 at first announced that they would continue to strike, but two days later they agreed to return, too.

Local 601, however, still maintained that the company had violated the contract by starting the job studies. Westinghouse denied the charge, declaring that it had the right to time-study the jobs held by day workers, such as crane operators and service employees.

Robert D. Blasier, vice president of industrial relations for Westinghouse, said the strike was "against the right and obligation of Westinghouse management to manage its plants efficiently."

Local 601's complaint will be considered simultaneously with negotiations for a new I. U. E. wage agreement now being discussed.

Atomic Energy Course

The course in Atomic energy, offered by the New York Section of the American Institute of Electrical Engineers, will begin Oct. 5 instead of Sept. 27 as previously reported in EW. The 12-lecture course is entitled "The Principles and Engineering Application of Atomic Energy."

ODM Again Unshackles Tax Write-Off Program

The on-again, off-again government tax write-off program to boost electrical capacity is on again. But only for another three months.

Last month, the Office of Defense Mobilization shut down for the second time the electric power expansion goal among others included in the program. This suspended action on applications for five-year tax amortization certificates on new capacity.

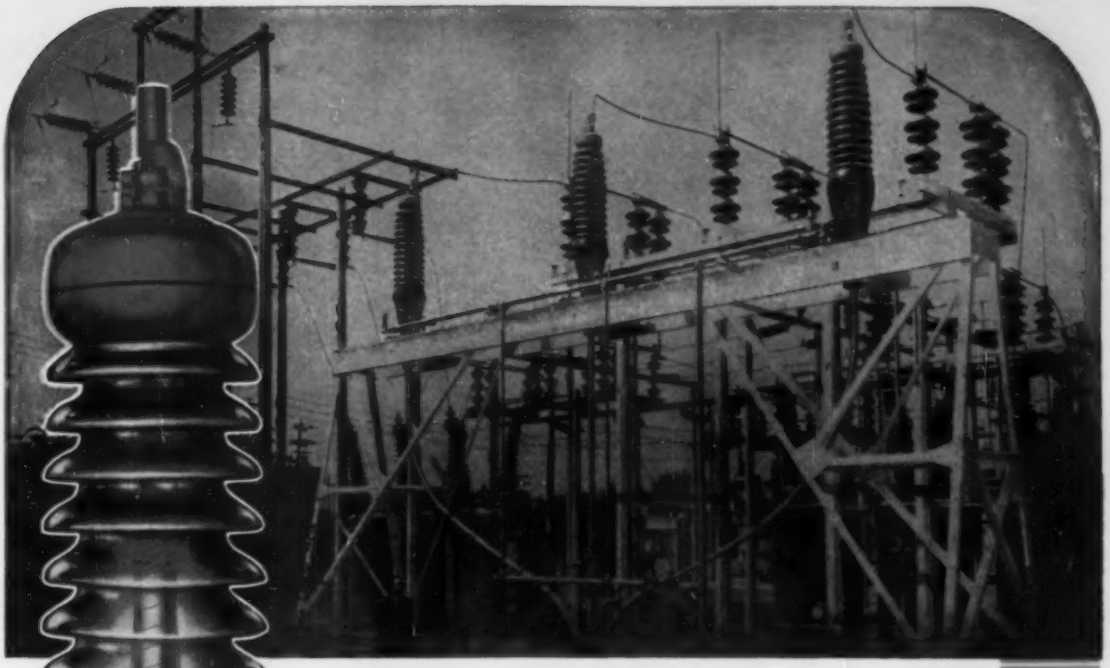
Last week, ODM once again prepared to open up the goal, which calls for raising the nation's capacity to 150-million kw by 1958. But it warned that it's only open until Dec. 31, 1955.

Reopening of the power goal for a limited time is understood to be designed to make the program a little more equitable by giving a few more power companies a chance to take advantage of the tax benefits in the same way as did early-comers.

Commenting on Central Illinois Light Co's fast write-off application for a new generating plant, T. A. Schlink, the utility's president, said, "For a utility planning to take care of its normal growth, I question the advisability of a fast write-off."

State Power Line Okayed

Gov Averell Harriman gave New York State Power Authority the go-ahead to build its own transmission lines to supply three customers with 140,000-kw from St. Lawrence River Project (EW, July 25, p 79). Niagara Mohawk Power Co and other utilities will have a chance to present the case for private facilities at SPA hearings set for Oct. 17, New York City. State law stipulates that existing private lines must be used if "adequate" and rates are "reasonable."



High Pressure . . . Oil filled
POTHEADS by G&W

Proper treatment of mechanical and electrical stresses permit this simple G&W design. Full 200 pound pipe line oil pressure is retained by the relatively small bore porcelain shell. Tested at 500 p.s.i. pressure. No castings are used for withstand of pressure. Top and bottom fittings are fabricated, non-magnetic, stainless steel—sealed by fully retained "Resistoyl" gaskets.

Stress relief cone, supplemented by porcelain stress control tube, makes efficient use of the internal diameter and length of porcelain shell—and reduces the amount of installation labor.

Phantom view shows G&W type "ATA" 161 kv. pothead. Background installation shows G&W type "ATA" 115 kv. potheads. The first 230 kv. potheads installed in U.S.A. are G&W type "ATA" at Garrison Dam, No. Dakota.

For further data, drawings and prices, send us a complete description of your cable.

G&W regularly furnishes Cable Joints, Oil Reservoirs, and accessories for oil and gas filled cables direct or through cable manufacturers.

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1905
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1955

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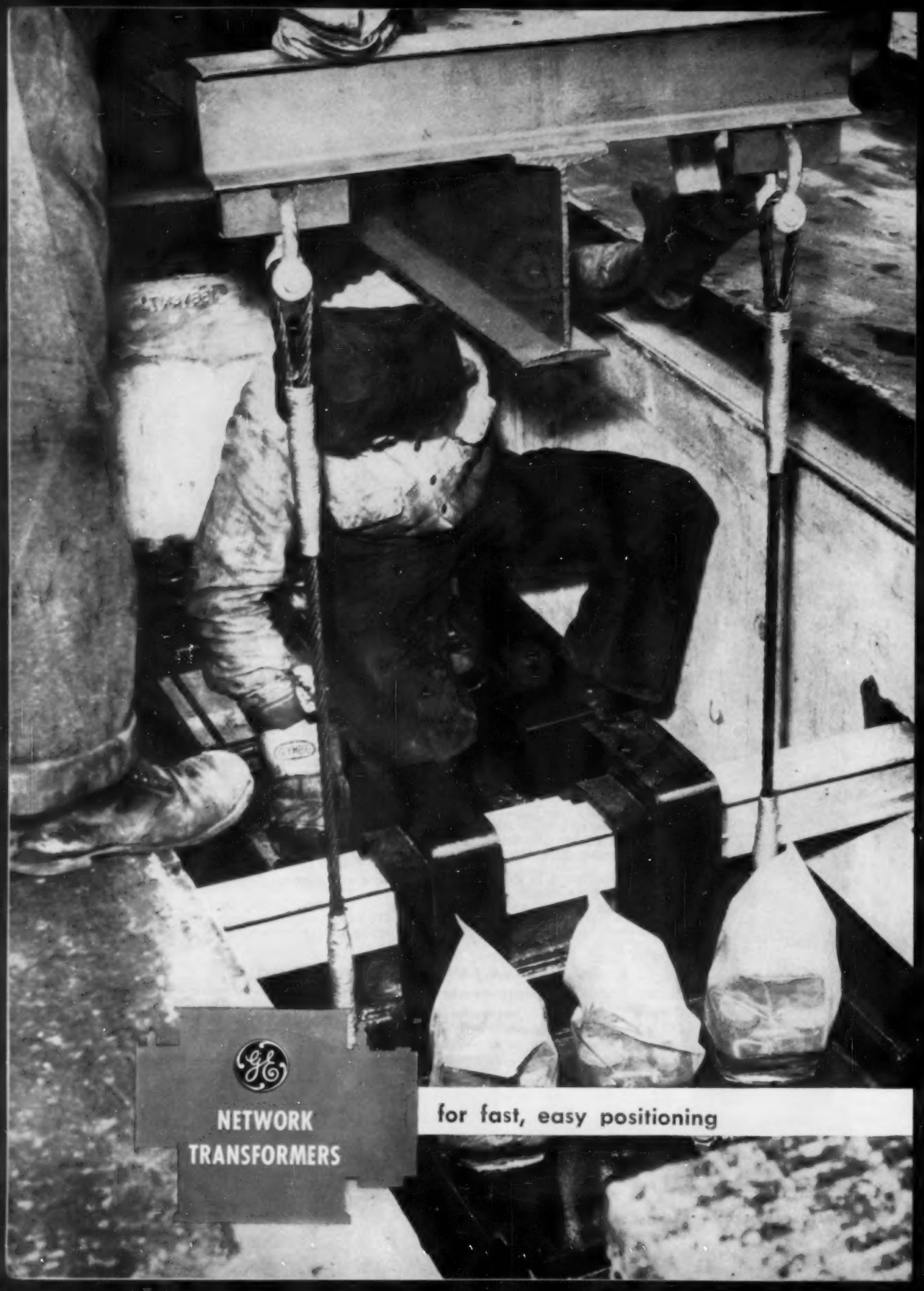
AT 551


NETWORK
TRANSFORMERS
for fast, easy positioning

NEW SUSPENSION MOUNTING

reduces positioning time for G-E network transformers to minutes instead of hours

A new design idea—suspension mounting—now greatly simplifies installation and maintenance of network transformers.

Developed jointly by General Electric and Consolidated Edison Company of New York, suspension mounting enables you to position a transformer in a fraction of the time formerly required. Vault floors need not be level. Furthermore, your construction men can quickly level the transformer since it is much easier to shim an I-beam cross bar before hanging a transformer from it than to shim a transformer after placing it on a vault floor. The Consolidated Edison men placed their first unit in position and levelled it in less than 10 minutes!

MAINTENANCE IS SIMPLIFIED, TOO

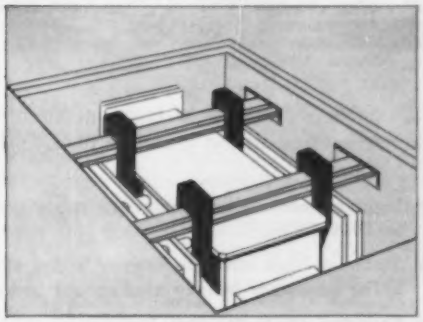
With suspension mounting, the transformer is 8 to 10 inches above the floor of the vault, away from corrosive elements such as sewage, dirt, and chemicals, which collect in most vaults. This retards corrosion of the tank, making it necessary to clean the vault far less frequently than when the transformer is set on the floor. When cleaning becomes necessary, it's easy to flush out the vault because there is clear passage under the transformer.

It's also easy to clean and repaint the transformer. Radiators are of the panel type, with large flat surfaces easily accessible from the top or ends. Just use a long-handled brush or nozzle.

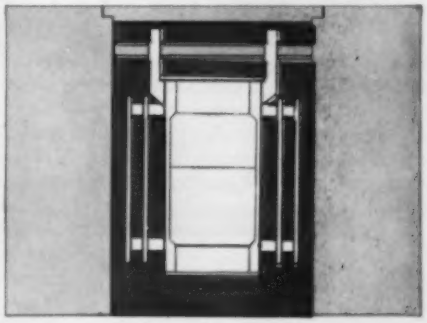
Maintenance is simplified in other ways, too. You can remove bushings, for example, from the outside of the tank. There are no large gaskets to replace. Accessories are located on the high-voltage end of the transformer where you can easily reach them. It's easy to inspect the network protector because it slides out on rails.

HELP FOR YOU

For help in solving your network problems and for complete information on the advantages of suspension-mounted G-E network transformers, see your local G-E sales representative. General Electric, Schenectady 5, N. Y. 4154



SUSPENSION MOUNTING. Two sturdy hooks rest on I-beams installed above transformer. Each beam rests on bearing plate in side-wall recess.



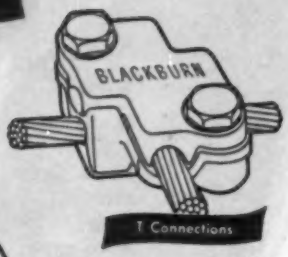
PLENTY OF SPACE under transformer keeps it above chemicals and debris, retarding corrosion and permitting fast and easy cleaning of vault.

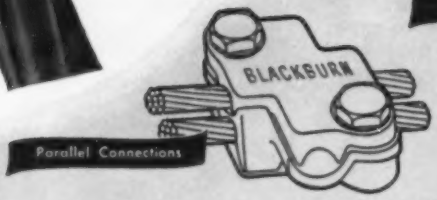
Progress Is Our Most Important Product

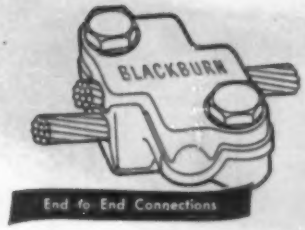
GENERAL ELECTRIC

You can handle a wide variety of jobs with this

Stronger, More Versatile BLACKBURN Cross Tap CLAMP







Get quick service for a large number of different connection and wiring jobs with BLACKBURN'S Cross Tap Clamp.

- **Eight connectors accommodate cable sizes from #6 to 1000 MCM.**
- **Made of high strength copper alloy; silicon bronze bolts; phosphor bronze shakeproof lockwashers.**
- **Rounded edges for easy taping.**
- **Greater wrench rotation with either end or socket type speeds installation.**
- **Available from Electrical Distributors everywhere.**

Also available completely tin plated for general purpose work.

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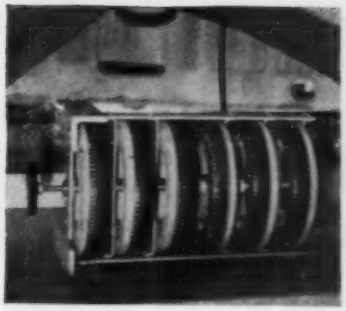


RHEOSTAT aboard ship controls flow of current preventing hull deterioration

CARBON ELECTRODES are fastened to cables carrying dc to offset destructive electrolysis; here supply is inspected

Electrical 'Moth-Balling' Preserves Ships

Expenditure of $1,500 monthly for electricity is preventing the deterioration of 150 ships worth millions of dollars which the U. S. Maritime Administration is holding in reserve at Olympia, Wash.

A metal ship quickly deteriorates when anchored in shallow salt water and normally would require drydocking for replacement of bottom plates at a cost of more than $5,000. An electrolysis develops and pits the surface of the steel as the current created flows from ship to ground.

This electrolysis is prevented by producing an electrically neutral body of water surrounding the steel hulls. To accomplish this, underwater cables on which are fastened 4-in. carbon electrodes 5 ft long (above right) are energized with direct current of positive polarity, an offsetting current produced to flow from the circuit to the ship.

Three-phase alternating current is provided by the Puget Sound Power & Light Co from a transformer bank on shore. The load is 300 kw, continuous use, with secondary voltage delivery at 480v, three phase. The Maritime Administration carries the current in submarine cables to six fleets of ships, anchored in close formation. Aboard every seventh ship the three-phase power is converted to direct current with the use of rectifiers which transmit the power at 12v, dc, and a 300-amp average per conductor.

Submarine cables frame the projection of each ship at the bottom of the water. On each ship a rheostat (above left) is provided to control the flow of current in its protective electrodes. The insulated submarine cables supplying the alternating current are 2/0 and 4/0 in size, while the dc cables surrounding ships average 500,000 circular mills in size.

Editorials Favor Dixon-Yates, EEI Survey Says

More than half of the editorial comment rising from President Eisenhower's cancellation of Dixon-Yates contract was favorable, an Edison Electric Institute survey indicated. It revealed 54% favorable, 30.5% neutral, and 15.5% unfavorable toward private power and the contract cancellation.

Similar EEI surveys in December 1954 and January 1955 also showed a 54% favorable editorial comment on Dixon-Yates. However, an additional 8.5% was represented in the unfavorable bracket for a total of 24%, while 22% was neutral.

The post-cancellation analysis was based on less than 200 items, while the two previous checks covered more than 750 editorials. The decline in editorial volume seemed to indicate a waning of interest in the issue.

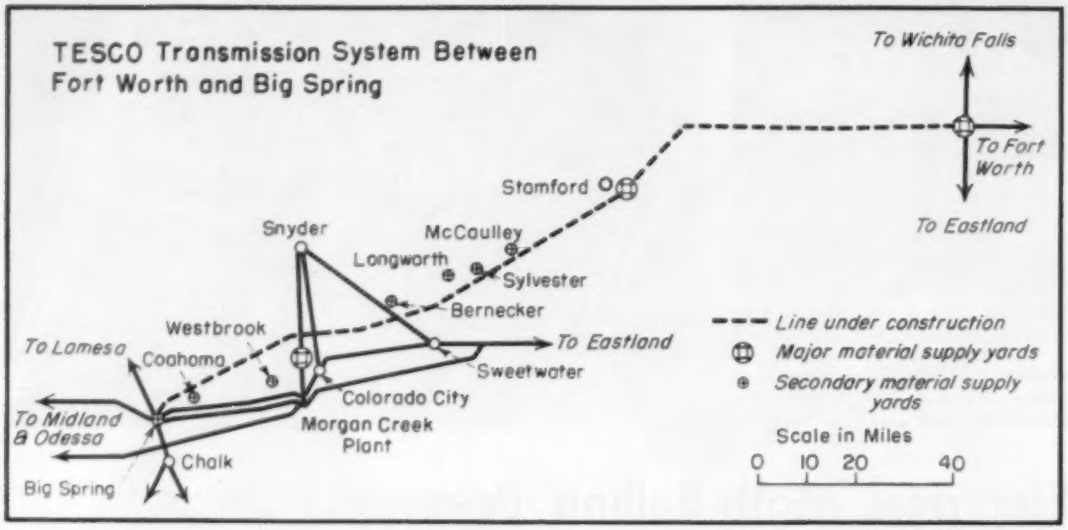
The check after cancellation turned up 27 favorable editorials from Alabama, Arkansas, Georgia, Florida, Louisiana, the Carolinas, Tennessee, and Virginia. This contrasted with 11 unfavorable from Alabama, Florida, Georgia, North Carolina, and Tennessee. No other unfavorable items were received from Southern states.

Although editorial interest in the Dixon-Yates contract may have faded, Guaranty Trust Co of New York declared the main issues are very much alive.

"This is the fate," says the current Guaranty Survey, "that seems to have befallen the much-debated Dixon-Yates contract. A straightforward, businesslike, orthodox agreement to meet the growing need for electric power in a limited area has been caught up by the political winds, inflated into a symbol for the whole issue of 'private' versus 'public' power, and converted into ammunition for the 1957 Presidential campaign."

Last of DC in Georgia

Georgia Power Co's last rotary dc converter spun to a stop recently. Fulton County courthouse was the last direct current customer before the Walton Substation in Atlanta went out of business. The plant will be dismantled and retired.



MATERIALS WERE SPOTTED AT TEN POINTS ALONG TRANSMISSION LINE BEING BUILT FROM GRAHAM TO BIG SPRING

Depots Hurry Work on 187-Mile Line

TRANSMISSION
Construction

Three major and 7 minor storage yards overcome supply difficulties due to distance in building TESCO'S 138-kv, H-frame line

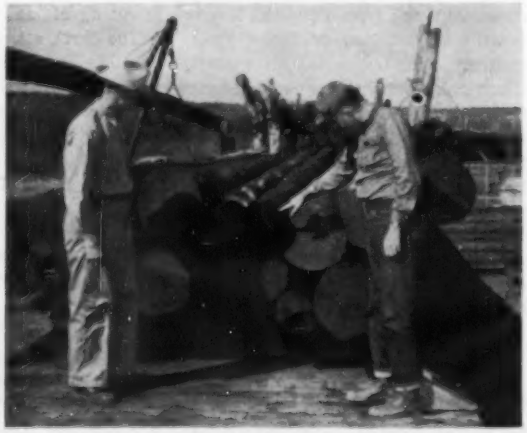
Materials handling was a major problem of the Texas Electric Service Co in building as a single project its 187 miles of 138-kv, H-frame line between Graham and Big Spring, Tex. Materials had to be spotted along the line to hold hauling distances to a minimum, and this involved consideration of the availability of railroads and highways, location of storage yards, and distribution of materials ordered on the basis of design specifications over the terrain to be traversed.

Major storage yards were at Graham and near Stamford and Colorado City. Seven minor yards, exclusively for storing poles, were spaced out over the western half of the route. Lack of convenient railroad sidings ruled out pole yards between Graham and Stamford.

The Graham yard contained materials for building the line about half way to Stamford. Materials included poles, hardware, insulators, braces, crossarms, and conductor.

At Stamford materials were stored

CONSTRUCTION of 138-kv transmission line was carried out as a single project. The line is longest ever built by TESCO



400 CARLOADS of poles and 120 carloads of other materials were stored close to railroad sidings and construction site

COLORADO CITY YARD STORES CONDUCTOR AND CROSSARMS (ABOVE), INSULATORS AND ARMOR RODS (BELOW)

for building from the midpoint between there and Graham to midway between Stamford and Big Spring. The major yard near Colorado City was used primarily for materials other than poles, which were stored in secondary yards in this area nearer to where they were to be installed.

To speed deliveries, trucks with A-frames accompanied hauling vehicles on a round-trip basis between storage yards and construction areas.

Materials Filled 520 Cars

It was estimated that more than 520 carloads of materials would be needed. Poles took 400 flat cars, and the 650 reels of ACSR more than 40 railroad cars.

Timbers for crossarms filled 40 cars. There were ten carloads of insulators, 20 of shield wire, four of angles, and a carload each of suspension clamps, ground wire, and staples.

There were several carloads of incidental materials, including the 62,000 bolts required.

The line will be the longest transmission line built by TESCO at one time and is believed to be the longest ever built in the Southwest as a single project. It will provide another trunk connection between the western and central portions of the utility's power system and strengthen transmission facilities in the western division. A switching station is to be built at Graham, and the one at Big Spring is being enlarged to handle the region's growing load.

650 REELS OF ACSR were dispensed from the three major storage yards at Colorado City, Stamford, and Graham which are 80 miles distant from each other

40 CARLOADS OF CROSSARM TIMBERS was only one of the many big lots of equipment which had to be on hand before construction of 187-mile line could start

BOOK REVIEW

Clarifying Today's Nuclear Language

National Research Council publication clears away semantic mists and barriers separating the atomic theorist and the practical utility company engineer*

The nuclear physicist is not a mystigog. He knows what he's talking about. The utility engineer will know too and converse with him on an easier footing when he has some familiarity with the following definitions:

A

Absorber—A substance that absorbs neutrons without reproducing them. Such a substance may be useful in control of a reactor or, if unavoidably present, may produce an undesired impairment in neutron economy. Neutron absorption is an important function of the shield surrounding a reactor. Almost all substances absorb slow or thermal neutrons to some extent, cadmium and boron especially. For absorbing gamma rays, dense materials are best.

Accelerator—A device for imparting large kinetic energy to charged particles, such as electrons, protons, deuterons, and helium ions. Common types are the cyclotron, synchrotron, synchro-cyclotron, betatron, linear accelerator, and Van de Graaf electrostatic accelerator.

Alpha particle—A positively charged particle emitted from a nucleus and composed of two protons and two neutrons. It is identical in all measured properties with the nucleus of a helium atom.

Atomic number—An integer that expresses the positive charge of the nucleus in multiples of the electronic charge. In present theory it is the number of protons in the nucleus and is equal to the number of electrons outside the nucleus of the neutral atom.

Atomic weight—The weighted mean of the masses of the neutral atoms of an element expressed in atomic weight units. Unless otherwise specified, it refers to a naturally occurring form of the element. The atomic weight unit, awu, is exactly $\frac{1}{16}$ of the weighted mean of the masses of the neutral atoms of oxygen of isotopic composition found in fresh lake or rain water; 1 awu = 1.660×10^{-24} gm = 1,000272 amu.

Average life—The average of the individual lives of all atoms of a particular radioactive substance. It is 1.443 times the radioactive half-life.

B

Barn—A unit of area in expressing a nuclear cross-section. 1 barn = 10^{-24} cm². Cross-sections per atom are customarily measured in barns.

Beta particle—A negative electron or a positive electron (position) emitted from a nucleus during beta decay. The β, β^- and β^+ are reserved for electrons of nuclear origin.

Breeding gain—Breeding ratio minus one.

Breeding ratio—The number of fissionable atoms produced per fissionable atom destroyed.

Burn-up—Destruction of atoms by neutrons in reactor operation; the term can be applied to fuel or other materials.

C

Capture—A process in which an atomic or nuclear system acquires an additional particle; eg, the capture of electrons by positive ions or nuclei, or of neutrons by nuclei. The gamma rays so emitted are capture gamma rays.

Chain reaction—A reaction in which one of the agents necessary to the reaction is produced by the reaction so as to cause like reactions. In the neutron-fission chain reaction a neutron plus a fissionable atom causes a fission resulting in a number of neutrons which, in turn, cause other fissions.

Circulating reactor—A nuclear reactor in which the fissionable material circulates through the core. Ordinarily this involves the use of fissionable material in fluid form or in small particles suspended in a fluid.

Control system—A system of apparatus for controlling the rate of reaction in a nuclear reactor. The term may refer to all apparatus for this purpose or to one of several essentially independent arrangements, such as a regulating and safety system. A reaction may be controlled automatically by a servo system that adjusts the control elements as necessary to hold the flux level close to a desired value. A reactor may have a tendency toward stability because of self-regulation, but the quality of stability ordinarily is not considered part of the control system.

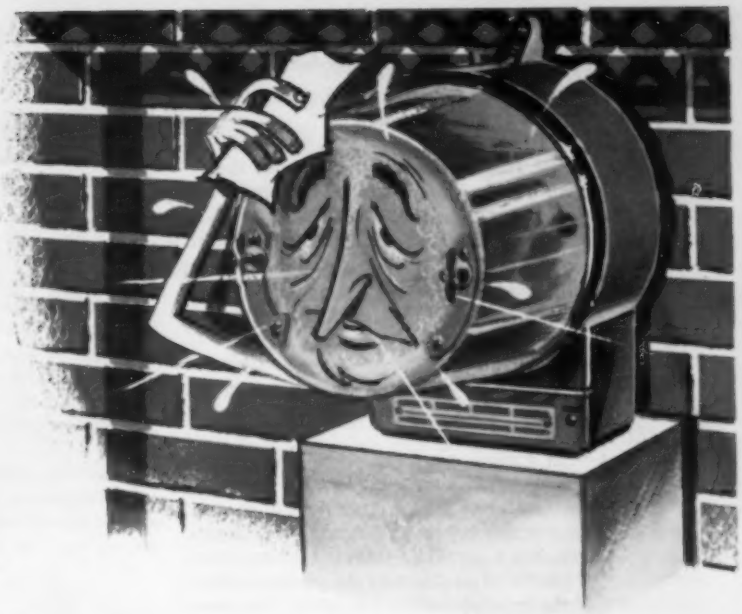
Converter—A nuclear reactor that converts fertile atoms into fuel by neutron capture. Two different ways of using the words, converter and breeder, are now in use:
1. A converter is a reactor that uses one kind of fuel and produces another (eg, consumers U^{235} and produces Pu from U^{238}) and a breeder produces the same kind of fuel (eg, consumes Pu and produces more Pu from U^{238}).
2. A breeder is a converter producing more fissionable atoms than it consumes.

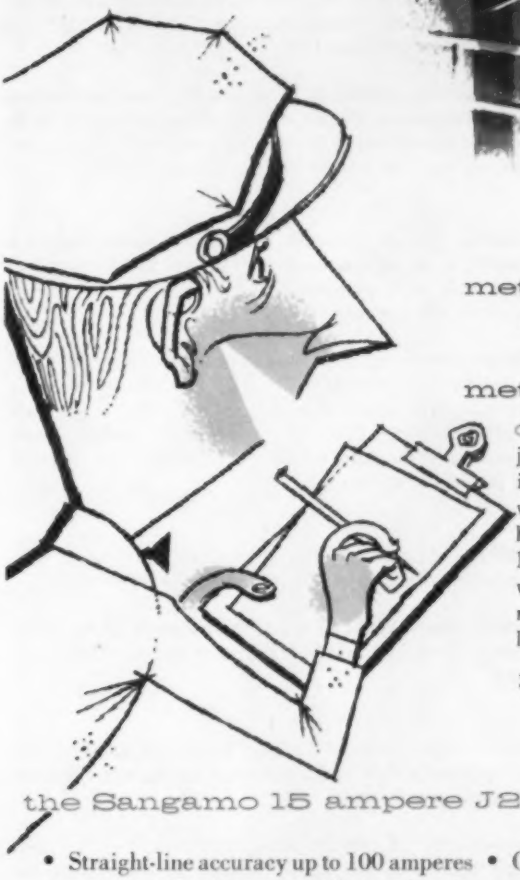
Coolant—A substance, ordinarily fluid, for cooling any part of a reactor in which heat is generated. Such parts include

(*Continued on page* 20)

* "A Glossary of Terms in Nuclear Science and Technology," (American Society of Mechanical Engineers, New York, N. Y., 189 pp., $5) from which the material for this article has been adapted with permission.

if any one of 26 million old meters* could talk...





meterman: Well, how do you feel today, old-timer?

old meter: Howdy, bub! Not so good. When are those fellas down at the light company gonna retire me?

meterman: Why, I don't know old-timer. What's the trouble?

old meter: I'm tired, bub. I just can't keep up with the job. Back in 1939, these Jacksons had a radio, a refrigerator, an iron and a vacuum cleaner... and, of course, their lights. Well, that wasn't so bad. I didn't have any trouble keeping track of a load like that. But today, *whew!* It's just gotten to be too much for me. Now, they've added an electric range, a TV set, an automatic washer and dryer, a dishwasher—and I hear Mrs. Jackson is making a big fuss for air conditioning. I'm not built to measure loads like that. I'm not up to modern living.

* 15 million meters now in service are inadequate for today's loads and 11 million more are in the "doubtful" category according to surveys recently published in *Electrical World*. A copy will be mailed you on request.

the Sangamo 15 ampere J2 is built to handle today's loads

• Straight-line accuracy up to 100 amperes • Corrosion-resistant finishes and materials • High torque, lifetime bearing system • High insulation level • Slow disk speed • *These features make your investment in J2's the best you can make in watthour meters.*

the Sangamo J2 meter is the SLOW SPEED METER

SANGAMO ELECTRIC CO.

SPRINGFIELD, ILLINOIS

Nuclear Language

(*Continued from page* 18)

not only the core but the reflector, shield, and other elements heated by absorption of radiation.

Core—In a nuclear reactor, the region containing the fissionable material. The body of a fuel or moderator and fuel in a nuclear reactor. It does not include the fuel outside the active section in a circulating reactor. Identical with active lattices in a reactor. In a heterogeneous reactor the region containing fuel-bearing cells.

Critical size—Any one of a set of physical dimensions of the core and reflector of a nuclear reactor maintaining a critical chain reaction, the material and structure of the core and the reflector having been specified.

Cross-section—For a given event, the probability per unit flux and per unit time, that the event occur. The cross-section per atom of medium has the dimensions of an area; whereas the cross-section per unit volume of medium is a reciprocal length. For a particular nuclear reaction cross-section may be greater or smaller than the geometric cross-section πR^2. If the reaction cannot take place, the cross-section is zero. For any collision reaction between nuclear or atomic particles or systems, cross-section is an area such that the number of reactions taking place is equal to the product of the number of incident particles which would pass through this area at normal incidence and the number of target particles or systems.

Curie—The unit of radioactivity defined as the quantity of any radioactive nuclide in which disintegrations per sec is 3.7×10^{10}.

Curtain—A thin shield, usually cadmium, shutting off a flow of slow neutrons.

Cyclotron—A device for accelerating charged particles to high energies by means of an alternating electric field between electrodes placed in a constant magnetic field.

D

Delayed neutrons—Neutrons emitted by excited nuclei formed in a radioactive process (beta disintegration, in all cases so far known), so called because emitted an appreciable time after the fission.

Deuterium—The hydrogen isotope of mass number 2 found in natural hydrogen to the extent of 1 atom in 6,500 ± 100.

E

Electron—An elementary particle of rest mass m, equal to 9.107×10^{-28} gm and charge equal to 4.802×10^{-10} statcoul. Its charge may be either positive or negative. The positive electron is usually called a positron; the negative the negatron.

Electron volt—A unit of energy equal to the energy gained by a particle having one electronic charge when it passes in a vacuum through a potential difference of 1 v; 1 ev = 1.60×10^{-12} erg.

Element—**1.** A substance all of whose atoms have the same atomic number. **2.** A naturally occurring mixture of isotopes. **3.** A class of atom having a particular atomic number as its characteristic.

Enriched material—**1.** Material in which the amount of one or more isotopes of a constituent has been increased. **2.** Uranium in which the abundance of the U^{235} isotope is increased above normal.

F

Fertile—Capable of being transformed into a fissionable substance by capture of a neutron. Common examples are thorium (Th^{232}) and uranium (U^{238}). In case the nucleus is capable of capturing a neutron and, after existing as an intermediate element of relatively short half-life, of becoming a fissionable nucleus, uranium (U^{233}) from Th^{232} and plutonium (Pu^{239}) from U^{238}.

Fission—The splitting of a nucleus into two more-or-less equal fragments. Fission may occur spontaneously or be induced by capture of bombarding particles. Neutrons and gamma rays are usually produced during fission.

G

Gamma ray—A quantum of electromagnetic radiation emitted by a nucleus, each such photon being emitted as the result of a quantum transition between two energy levels of the nucleus.

Geiger counter—A gas-filled chamber usually consisting of a hollow cylindrical cathode and a fine wire anode along its axis. It is operated with a voltage high enough such that a discharge triggered by a primary ionizing event spreads over the entire anode until stopped by the reduction of the field by space charge.

H

Half-life—The average time required for the decay of one-half the atoms of a sample of radioactive substance.

Heavy water—Water in which the hydrogen of the water molecule consists entirely of the heavy hydrogen isotope of mass.

I

Isobar—One of several nuclides having the same number of nucleons in their nuclei and hence having approximately the same atomic mass.

Isomer—One of two or more nuclides having the same mass number A and atomic number Z, but existing for measurable times in different quantum states with different energies and radioactive properties.

Isotope—One of several nuclides having the same number of protons in their nuclei, and hence belonging to the same element, but differing in the number of neutrons and therefore in mass number A, or energy content.

L

Linear accelerator—A device for accelerating particles. It employs alternate electrodes and gaps arranged in a straight line, so proportioned that when their potentials are varied in the proper amplitudes and frequency, particles passing

(*Continued on page* 25)

Here's Proof of Performance...

501 of 512 pressure-creosoted poles still standing in this 27-year-old line

Duke Power Company, Charlotte, N. C. —supplying power to 40% of the nation's textile spindles—has been using pressure-creosoted poles since 1913. Careful records kept by Transmission Engineer M. E. Kimbrell show an extremely low rate of pole failure.

A 17.4-mile transmission line between Elkin and North Wilkesboro, N. C. was erected in 1928 with 512 pressure-creosoted poles. Today, 501 of these poles are still in service in their original locations.

Pressure-creosoted poles which Duke Power Company is obtaining today not only meet the requirements for long life, but high standards of pole cleanliness as well.

Your pressure-treater can supply you with poles that meet these requirements, especially if he uses USS Creosote. It's a uniform preservative, made to give uniformly good results. For complete information, contact our nearest Coal Chemical sales office listed below or write directly to United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa.

• • •

One of the 27-year-old pressure-creosoted poles in Duke Power Company's transmission line between Elkin and North Wilkesboro, N. C.

You can obtain clean pressure-creosoted poles upon specification without sacrificing pole service life.

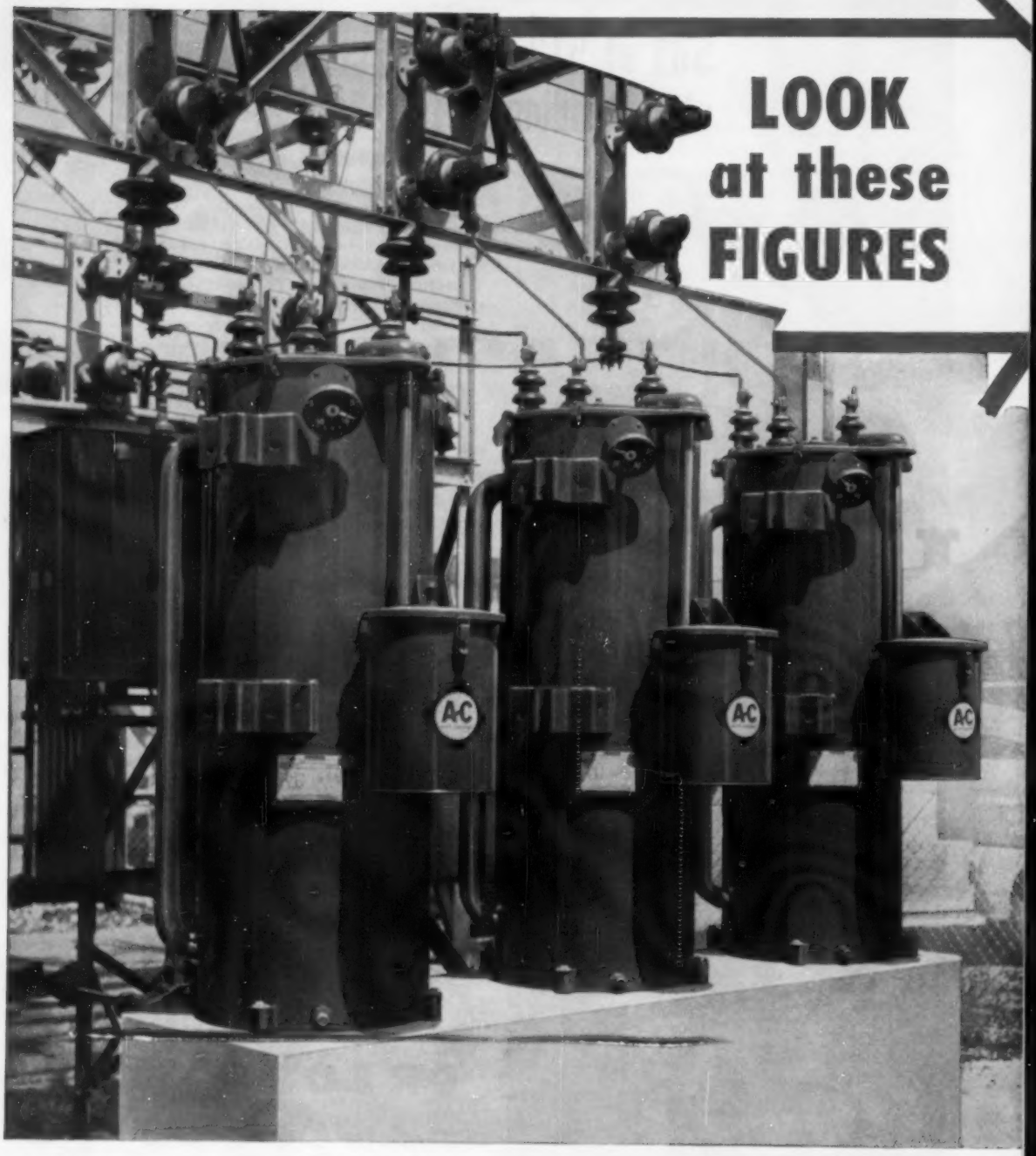
USS CREOSOTE

SALES OFFICES IN
PITTSBURGH, NEW YORK, CHICAGO, CLEVELAND, SAN FRANCISCO AND FAIRFIELD, ALA.

USS

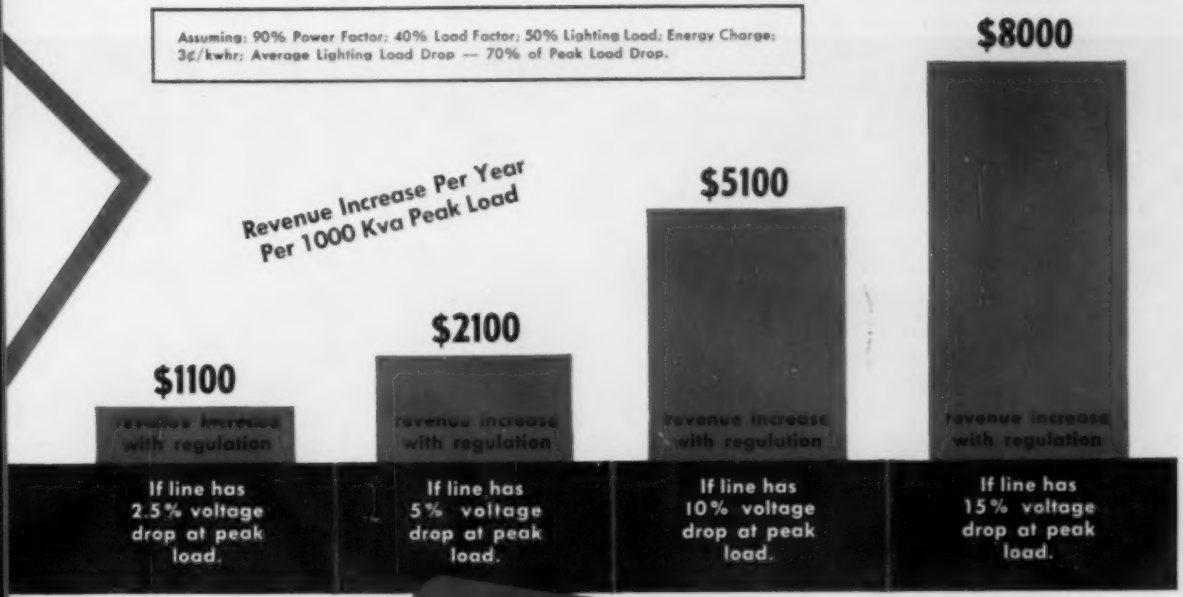
UNITED STATES STEEL

How Voltage



ALLIS-

Regulation Pays Off


Assuming: 90% Power Factor; 40% Load Factor; 50% Lighting Load; Energy Charge: 3¢/kwhr; Average Lighting Load Drop — 70% of Peak Load Drop.
Revenue Increase Per Year Per 1000 Kva Peak Load
$1100
revenue increase with regulation
If line has 2.5% voltage drop at peak load.
$2100
revenue increase with regulation
If line has 5% voltage drop at peak load.
$5100
revenue increase with regulation
If line has 10% voltage drop at peak load.
$8000
revenue increase with regulation
If line has 15% voltage drop at peak load.

ALLIS-CHALMERS 5/8% STEP VOLTAGE REGULATORS

• Here's what happens when you install an Allis-Chalmers distribution regulator on a line where voltage is only 5% low: in the first year revenue per regulator goes up $2100. That's more than the regulator costs. And taking all cost factors into consideration — that's enough to pay back the initial investment in less than two years, in most cases. From then on (long before the end of your normal depreciation period), the distribution regulator helps you make additional profits.

Best of all, at the same time you improve revenue you also improve customer satisfaction. With correct voltage, motors last longer, lights burn brighter, appliances give most efficient service. You get an added dividend: fewer complaints due to low voltage. You can concentrate service crews and equipment where they are really needed instead of wasting manpower and money testing voltage at customers' homes.

Keep Maintenance Low, Get Long Life

When you specify Allis-Chalmers voltage regulators you know you're getting a unit with minimum maintenance, longest possible life. No other ⅝% step regulator offers proof from years of actual field experience. Allis-Chalmers step-type regulators have been turning in excellent service records for more than 20 years.

For example, the mechanism is tested and proved to withstand 5 million operations. It will provide practically trouble-free operation. Ask any of the hundreds of distribution engineers who have had experience with it. They'll tell you why it pays to use only Allis-Chalmers voltage regulators.

More facts are available. Get them from your nearby A-C district office or write Allis-Chalmers, Milwaukee 1, Wis. A-4562

CHALMERS

ANACONDA EXPANDS IN ALUMINUM

Reduction plant of the Anaconda Aluminum Company at Columbia Falls, Montana, is soon to give Anaconda control over its aluminum production from reduction of alumina . . . to ingot . . . to finished product.

A new reduction plant — a new modern rod mill — five separate aluminum fabricating mills — an engineering organization with years of experience in industry problems — *all* assure completely integrated service for users of the white metal!

Newest in the United States is Anaconda's modern aluminum rod-rolling mill at Great Falls, Montana. In addition to rod mill, the building houses the latest wire drawing and stranding equipment.

Anaconda's five aluminum wire and cable fabricating mills today have two new big brothers.

One is the imposing new plant shown above—Anaconda Aluminum Company's new reduction plant at Columbia Falls, Montana. It will provide Anaconda with its own major source of primary aluminum – 120,000,000 pounds of the white metal a year.

The second is Anaconda Wire & Cable Company's new aluminum rod-rolling mill at Great Falls, Montana (below). This mill is the most advanced in the country. It is completely automatic.

Today, Anaconda's five strategically located aluminum wire and cable mills . . . together with Anaconda's national *network of distributors* . . . make certain you get the aluminum wire and cable you want – *where* and *when* you want.

Quality products are a tradition with Anaconda. The most modern aluminum facilities in the country are backed by long years of experience with *many* metals . . . with *all* types of transmission and distribution wire and cable.

For all your aluminum wire and cable . . . for the highest quality aluminum products today . . . for engineering assistance at every stage . . . you can look with confidence to Anaconda. Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York. 55074

*Reg. U. S. Pat. Off.

ANACONDA®

Bare aluminum • ACSR • Neoline* weatherproof • Duraline* weatherproof • Braid weatherproof • Polyethylene line wire • Type K service drop • Type N-SD service drop

Nuclear Language

(*Continued from page 20*)

through them receive successive increments of energy.

M

Mass defect—The difference between the atomic mass and the mass number A of a nuclide. For all known nuclides its absolute value is less than 0.1 amu.

Mass number—The total number of nucleons (protons and neutrons) in the nucleus of an atom or nuclide. It is signified by the integer nearest in value to the atomic mass when the latter is expressed in atomic mass units. According to present theory the mass number represents the total number of nucleons in the nucleus and hence is equal to the sum of the atomic number and the neutron number.

Moderator—Material in a nuclear reactor to moderate (slow down) neutrons from the high energies at which they are released. Neutrons lose energy by scattering collisions with nuclei of the moderator. A good moderator has high scattering cross-section and low atomic weight.

Multiplication constant—The ratio of the number of neutrons present in a reactor at a given time to the number present one finite life-time earlier.

N

Natural-uranium reactor—A nuclear reactor in which natural (unenriched) uranium is the principal fiissionable material.

Neutron—A nuclear particle of zero charge and mass number 1. The mass is 1.008941 amu.

Neutron economy—Degree to which neutrons are used in desired ways instead of being lost by leakage or useless absorption. Desired uses of neutrons may include maintaining the chain reaction, converting fertile to fissile material, producing other desired isotopes, and experimental uses.

Nuclear reactor—An apparatus in which nuclear fission may be sustained in a self-supporting chain reaction. It includes fissionable material (fuel) such as uranium or plutonium, and moderating material (unless it is a fast reactor) and usually includes a reflector to conserve escaping neutrons, provision for heat removal, and measuring and control elements. The terms **pile and reactor** are interchangeable, reactor now becoming more common. Usually applied only to systems in which the reaction proceeds at a controlled rate, they have also been applied to bombs. Reactors sometimes are designated according to the fuel used (eg, graphite or beryllium reactor), or the coolant (eg, gas-cooled, liquid-metal cooled).

A **thermal reactor** is a nuclear reactor in which fission is induced primarily by neutrons of such energy that they are in substantial thermal equilibrium with the material of the core. A representative energy for thermal neutrons often is taken as 0.025 (2,200 meters per sec) which corresponds to the mean energy of neutrons in a Maxwellian distribution at 293 K, although most thermal reactors usually operate at a higher temperature. A moderator is an essential element of a thermal reactor. In an **epithermal reactor** a substantial number of fissions (say 30 or 40%) is induced by neutrons of more than thermal energy.

In an **intermediate reactor** fission is induced predominantly by neutrons whose energies are greater than thermal but much less than the energy with which neutrons are released in fission. From 0.5 to 100,000 electron volts may be taken roughly as the energy range of neutrons inducing fission in intermediate reactors. The neutron absorption resonances of the fuel may be important in this range. A **fast reactor** is a nuclear reactor in which there is little moderation and fission is induced primarily by fast neutrons that have lost relatively little of the energy with which they were released. The slowing down of neutrons that occurs is due largely to inelastic instead of elastic scattering. About 100,000 electron volts is regarded as the minimum value of mean energy of neutrons inducing fission for a reactor to be considered fast, with ½ to ⅓ Mev more common. Sometimes the fission threshold of U^{238} is taken as the lower limit of the fast range. Reactors of this type have potentially high neutron economy.

In a **heterogeneous reactor** the fissionable material and moderator are arranged as discrete bodies (usually according to a regular pattern) of such dimensions that a nonhomogenous medium is presented to the neutrons. A **homogeneous reactor** is one in which the fissionable material and moderator (if used) are combined in a mixture such that an effectively homogeneous medium is presented to the neutrons. Such a mixture is represented either by a solution of fuel in moderator or by discrete particles having dimensions small in comparison with the neutron mean free path.

Nucleus—The positively charged core of an atom, with which is associated practically the whole mass of the atom, but only a minute part of its volume.

Nuclide—A species of atom characterized by the constitution of its nucleus. The nuclear constitution is specified by the number of protons Z, number of neutrons N, and energy content; or, alternatively, by the atomic number Z, mass number A (= N + Z), and atomic mass.

P

Packing fraction—The ratio Δ/A of the mass defect Δ and mass number A of a nuclide. It is positive for most nuclides of $A<16$ and $A>180$, and negative for most other nuclides.

Photon—A quantum of electromagnetic radiation. A photon of frequency ν has energy $h\nu$.

Pile—A nuclear reactor. The term comes from the first nuclear reactor, made by piling up graphite blocks and pieces of uranium and uranium oxide.

Proton—A positively charged elementary particle of mass number 1 and charge equal in magnitude to the electronic charge e. It is a constituent of every nucleus. The number of protons in the nucleus of each atom of an element is given by the atomic number Z of the element.

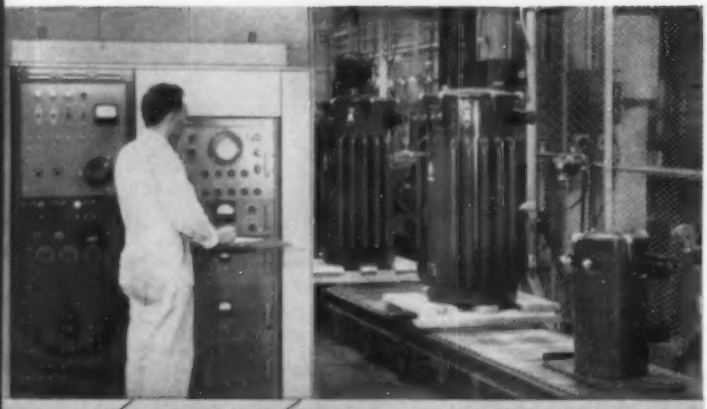
R

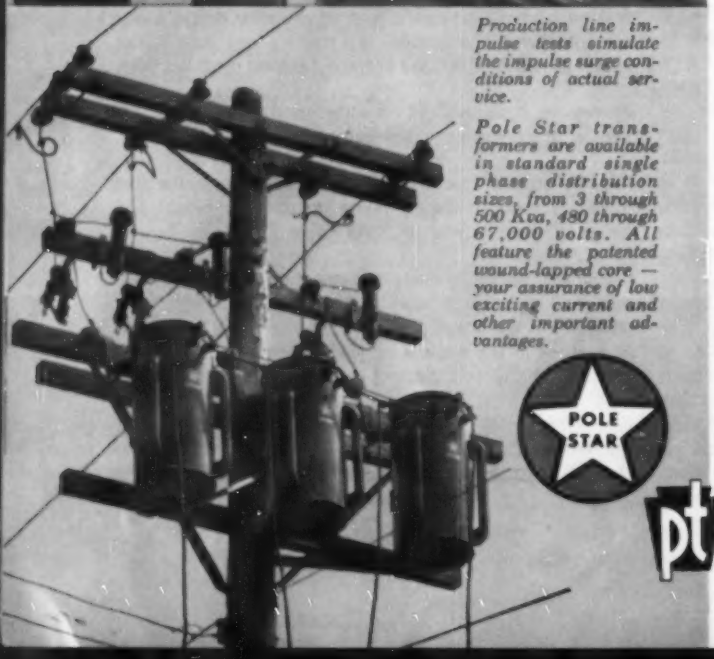
Radiation—The emission and propagation of energy through space or material medium in the form of waves;

(*Continued on page 27*)

"You're wastin' your time, Doc...

those Pole Star transformers were all IMPULSE TESTED at the factory!"





Production line impulse tests simulate the impulse surge conditions of actual service.

Pole Star transformers are available in standard single phase distribution sizes, from 3 through 500 Kva, 480 through 67,000 volts. All feature the patented wound-lapped core — your assurance of low exciting current and other important advantages.

The man is right, Doc! And you can bet your stethescope those Pole Stars are right, too. You see, Pennsylvania's production line impulse testing — standard procedure for all units from 3 through 100 Kva, 18 Kv and below — makes certain that Pole Star transformers are just as dependable as the name implies.

At Pennsylvania, impulse testing is performed after the units have passed all required ASA and NEMA tests. Transformers are tested *without arresters* — being subjected to impulse voltages that are higher than the basic impulse insulation levels required by ASA and NEMA standards. Since tests are made between layers and turns as well as to ground, these production line tests simulate the impulse surge conditions likely to occur throughout the entire transformer during actual service.

The apparatus used for detecting failures during these tests is so sensitive that it will disclose *even* a one-turn high voltage short circuit. Such rigid quality control means added years of trouble-free service with Pole Stars, and important reductions in maintenance.

Distribution Sales Department

Pennsylvania Transformer Company

A McGraw Electric Company Division

CANONSBURG, PA. • ***Greater Pittsburgh District***

Nuclear Language

(*Continued from page* 25)

eg, the emission and propagation of electromagnetic waves or of sound and elastic waves.

Radioactivity—Spontaneous nuclear disintegration with emission of corpuscular or electromagnetic radiations. The principal types of radioactivity are alpha disintegration, beta decay (negatron emission, positron emission, and electron capture), and isomeric transition.

Reactivity—A measure of the departure of a reactor from critical such that positive values of reactivity correspond to reactors above critical and negative values to reactors below critical. Often represented by (a) the multiplication constant minus one, (b) a quantity proportional to the inverse asymptotic period. Sometimes used interchangeably with the term multiplication constant.

Reflector—A layer or structure of material surrounding the core of a reactor to reduce the escape of neutrons. Neutrons entering the reflector are scattered randomly, some of them many times. A large portion may return ultimately to the core.

Residual activity—Radioactivity remaining in a substance or system at a specified time after a period of decay. In a nuclear reactor the activity that remains when the reactor has been operated and then shut down.

Roentgen—The quantity of x- or gamma radiation such that the associated corpuscular emission per 0.001293 grams of air produces, in air, ions carrying 1 esu of electricity of either sign.

S

Safety rod—A control rod capable of shutting down a reactor very quickly in event of failure of the control system.

Scattering—The change in direction of a particle or photon owing to a collision with another particle or another system.

Scram—Sudden shutting down of a nuclear reactor, usually by dropping safety rods. This may be arranged to occur automatically at a predetermined neutron flux or under other dangerous conditions, the reaching of which causes monitors and associated equipment to generate a scram signal.

Shield—A body of material preventing or reducing passage of particles or radiation. A shield may be designated according to what it is intended to absorb, as a gamma-ray shield or neutron shield, or according to the kind of protection it is intended to give, as a background, biological, or thermal shield. The shield of a nuclear reactor is a body of material surrounding the reactor to prevent escape of neutrons and radiation into a protected area which frequently is the entire space external to the reactor. It may be required for the safety of personnel or to reduce radiation sufficiently to allow use of counting instruments for research or for locating contaminating or airborne radioactivity.

Shim rod—A control rod for making occasional coarse adjustments in the reactivity of a nuclear reactor. It commonly moves more slowly than a regulating rod and, singly or as one of a group, can make a greater total change in reactivity.

Slow neutrons—Neutrons having kinetic energies up to about 10^2 ev. Loosely used as a synonym for thermal neutrons.

Slug—A lump of nuclear fuel, commonly a short round bar or cylinder, to be inserted into holes or channels in the active lattice of a reactor.

Specific power—Power produced per unit mass of fuel in a reactor. Specific power usually is based upon the fuel actually present but may be based upon the total investment, including fuel undergoing reprocessing.

Synchrontron—A device for accelerating particles, ordinarily electrons, in a circular orbit in an increasing magnetic field by means of an alternating electric field applied in synchronism with the orbital motion.

T

Temperature coefficient—One of a group of coefficients relating changes in reactivity of a nuclear reactor to changes in temperature of its components; the derivative of reactivity with respect to temperature. If the effect of these coefficients is negative so that a change in power level (hence in temperature) produces an opposite change in reactivity, the reactor may hold a nearly steady power level with very little further regulation.

Thermal neutrons—Neutrons in thermal equilibrium with the substance in which they exist; most commonly, neutrons of kinetic energy about 0.025 ev, the mean kinetic energy of a molecule at 15C.

Thorium—An element, atomic number 90, atomic weight 232.12. Important as a fertile material because Th^{232} may absorb neutrons and, decaying through the intermediate element protoactinium, yield a fissionable isotope of uranium (U^{233}).

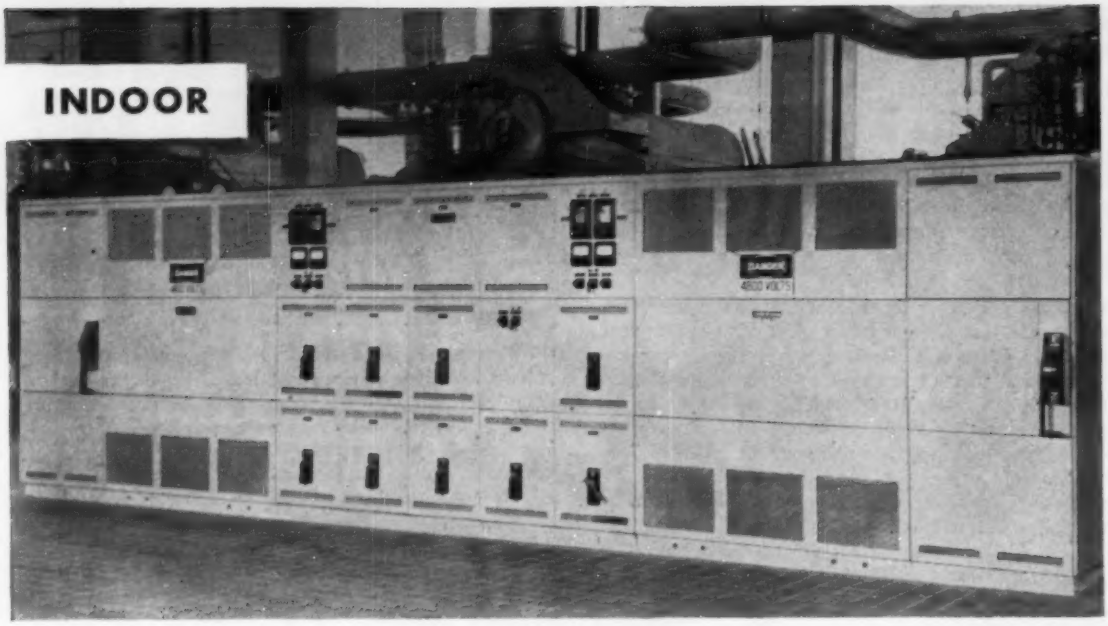
Uranium—An element, atomic number 92, atomic weight 238.07. Naturally occurring uranium is a mixture consisting of 99.28% U^{238}, 0.71% U^{235}, and 0.00580% U^{234} (formed by decay of U^{238}).

X

X-rays—Electromagnetic radiation of wave-lengths less than about 100A, produced: (i) when electrons striking a target lose kinetic energy in passing through the strong electric fields surrounding the target nuclei, thus giving rise to *bremsstrahlung* and resulting in a continuous x-ray spectrum; (ii) by the transitions of atoms from K, L, . . . energy states to lower energy states.

Z

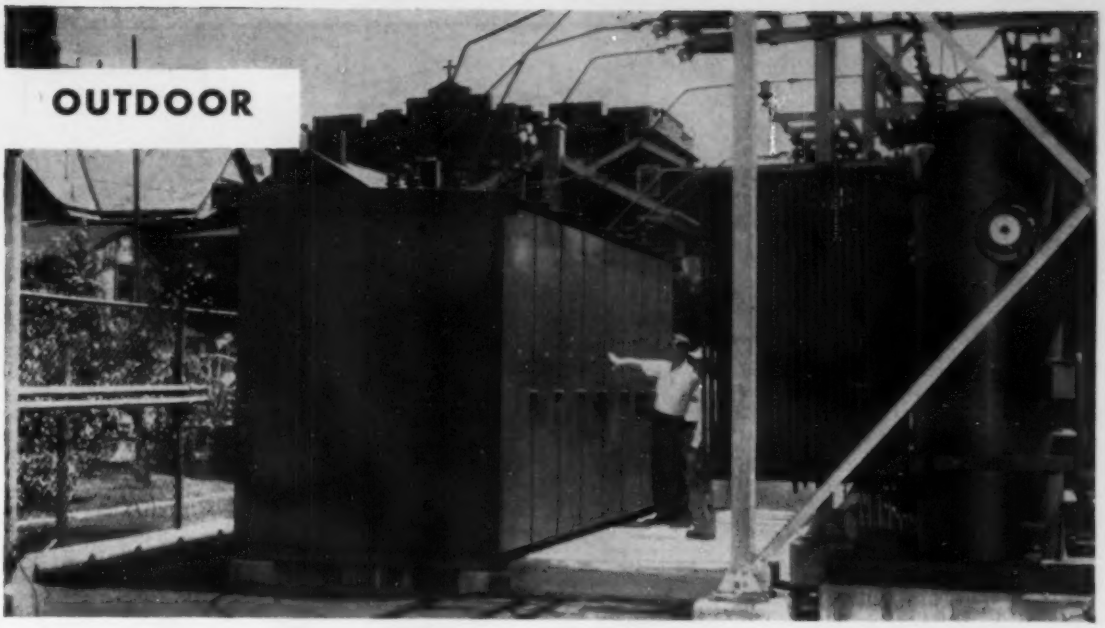
Zero-power reactor—An experimental nuclear reactor operated at low neutron flux and a power level so low that not only is no forced cooling required but fission product activity in the fuel is sufficiently low to allow the fuel to be handled after use without serious hazard.



I-T-E, SINGLE SOURCE OF SUPPLY

Primary Section: Maximum protection on the primary side is assured with I-T-E Power Air Circuit Breakers. As an alternate to circuit breakers, roof bushings, throats, terminal chambers, oil cutouts, liquid disconnect switches or air interrupter switches may be furnished.

Transformer Section: I-T-E can supply any type of transformer required for a particular installation. It can be either liquid filled, nitrogen sealed, or dry type. All transformers match and line up with the primary and secondary sections to create one complete unit.



FOR COMPLETE UNIT SUBSTATIONS

Secondary Section: The secondary section consists of I-T-E switchgear. Completely interchangeable, horizontal drawout air circuit breakers are housed in a sturdy structure with completely isolated compartments, large rigidly braced bus, and a superior exterior finish.

You can buy a unit substation either of two ways: a piece at a time (the expensive way), or all at once (the economical way). I-T-E can sell you the individual elements, but recommends that substations be purchased complete, and from a single source of supply.

There are good, practical reasons for this. I-T-E's engineering assistance in over-all planning, floor layout, and choice of elements is more valuable to you when it covers the complete substation. Units are packaged and shipped ready to install without delay or complications.

There are further advantages in knowing that one dependable company stands behind your complete installation, and that all parts are designed to function as a unit.

I-T-E Primary and Secondary Unit Substations can be supplied for any application: indoor and outdoor, and in any standard rating. For details, contact the I-T-E sales office nearest you. Look in your classified directory under "Electric Equipment." I-T-E Circuit Breaker Company, Switchgear Division, 19th & Hamilton Sts., Philadelphia 30, Pennsylvania.

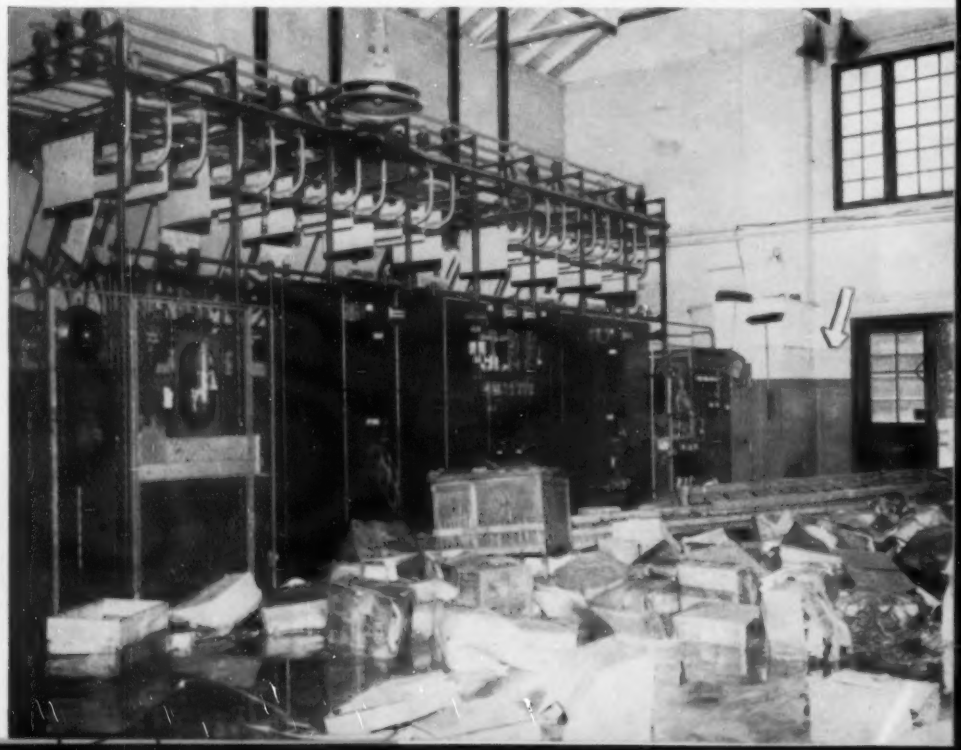
I-T-E CIRCUIT BREAKER COMPANY
Switchgear Division

TRANSMISSION—DISTRIBUTION
Maintenance

HELICOPTER, on second attempt, spanned Delaware River with nylon rope, enabling Rockland L&P to restore permanent transmissions lines

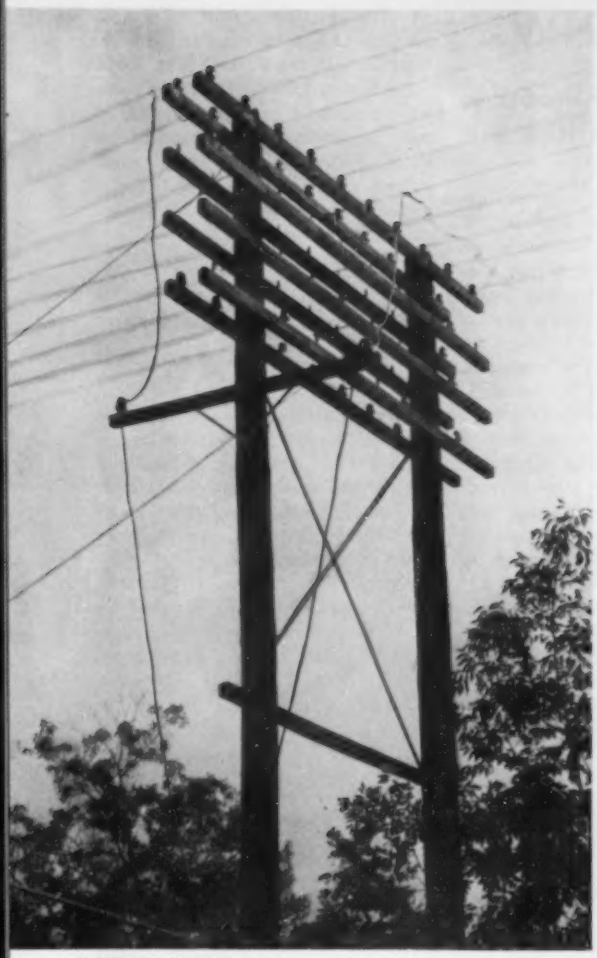
Improvisation Marks Flood Repairs

- Utilities evolve new techniques to cope with 'Diane's' flood damage
- Helicopter again proves usefulness by stringing lines across river
- Western Union lines temporarily carry kilowatts instead of messages



ARROW shows high water level inside Stroudsburg substation of Pennsylvania P&L. Debris on floor lies in sea of mud

PENNSYLVANIA P&L crews hauled materials into East Stroudsburg by tow line across Brodhead creek—only route



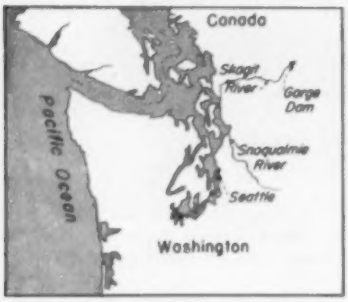
WESTERN UNION lines above, carried 2,300 v for 10 days while Rockland L&P rebuilt wrecked distribution lines in Pennsylvania. WU rerouted its circuit during emergency

60-FT WOOD POLE is jockeyed into position for hoisting after 600-ft journey across river. Bridge once was located here

DISPATCHING end of tow line is marked by flood's chaos. Hard work brought service to East Stroudsburg 90 hr after initial blackout

'Ice Dam' to be Built in NW

. . . by Seattle City Light which will freeze Skagit riverbed to 160-ft depth as part of coffer structure for Gorge High Dam



Before Seattle City Light can build the $15-million Gorge High Dam on the Skagit River, it must construct an "ice dam" which will serve as part of a cofferdam diverting the river from the construction area.

Decision to build the "ice dam" was reached when the dam site was found to be at a "pocket" up to 160 ft deep in the riverbed, which had been filled over the centuries with an accumulation of sand, gravel, and huge boulders. A cofferdam, to be effective, should extend down through the pocket to bedrock, but this would have been expensive and difficult, if not impossible, because of the deep bedrock cover.

City Light engineers decided, instead, to freeze the riverbed down to bedrock, preventing water seepage, and then construct a cofferdam on top of the frozen foundation. The contractors, Merritt-Chapman & Scott Corp of New York and the Savin Construction Corp of East Hartford, Conn., now are drilling and casing 6-in. holes to depths of 160 ft at 4-ft intervals in a single row across the riverbed to create an "ice dam" about 2 ft thick.

Approximately 80 of these freezing points will be required for each phase of the freezing program, as the cofferdam will be constructed in two stages, diverting the river first to one side and then the other. Each freezing point will consist of a 3-in. pipe enclosing a 1½-in. pipe, concentric with the casing and extending to within 6 in. of the bottom of the hole, set in the 6-in. hole. The 3-in. steel pipe will be capped on the bottom.

Refrigerant from a 250-ton refrigerating plant will flow into the 1½-in. pipe, discharge near the bottom of the 3-in. pipe, flow up the annular space between the two pipes, and then through a hose or pipe connection to the next freezing point. The brine supply and return headers are 8-in. steel pipes.

All freezing coils will be connected in parallel and each coil will be single pass with immediate return of the brine to the chiller. Because of the varying depth of the freeze holes, each coil will require a throttling valve to regulate the quantity of brine and thus the freezing rate. Each coil also will require cutoff valves for isolation in case of a coil rupture.

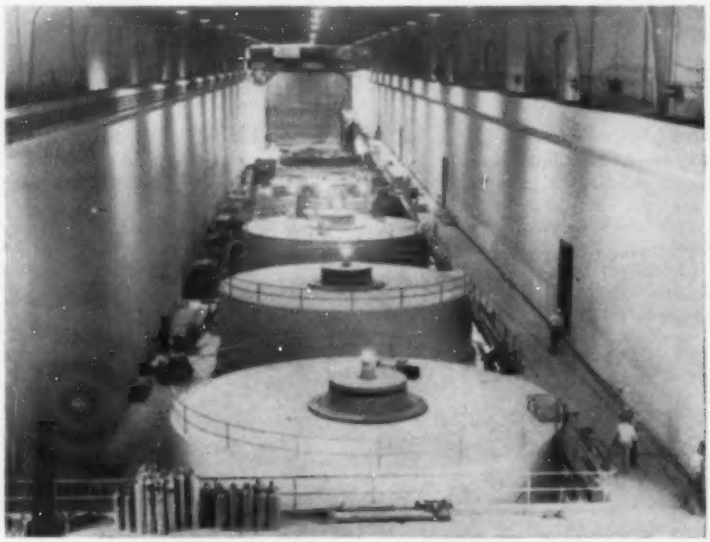
The operation will require a refrigerating plant composed of six completely self-contained brine and water cooling systems. All six units will be operated on maximum brine cooling load (250 tons) when freezing each cutoff wall. Capacity of each unit, cooling 167 gpm calcium chloride brine to −10 deg F, is 42 tons. Total brine flow is 1,000 gpm. Three units, with a capacity of 126 tons, will be used for holding duty on each frozen cutoff wall. All units are supplied by the York Ice Machinery Co.

The Gorge High Dam will replace an existing low dam.

Science Foundation Grant Helps Electrical Research

A $15,000 grant for research in electrical machinery has been made by National Science Foundation to Dr Leo A. Finzi, professor of electrical engineering at Carnegie Institute of Technology. This marks the foundation's third electrical engineering grant in the U. S. since 1953.

Educated in Europe, Dr Finzi is known internationally for his work on electrical machinery, power, and magnetic amplifiers. He was in charge of Westinghouse Electric Corp's high voltage impulse laboratory before joining the Carnegie Tech faculty in 1946.



Generators Humming at Chief Joseph

The first three generators were recently cut into operation at Chief Joseph Dam. Lights glowing on top of the three 64,000-kw units, shown above, signal the start of operation, culminating six years of construction.

The east section of the powerhouse will contain the first 12 generators. Four more are now being installed in the west section, which will eventually house 15 units. This ultimate expansion to 27 generators will provide a total capacity of 1,728,000 kw.

L. L. Clark, Distribution Transformer Sales Mgr., Pacific Coast, points out this

FACT: New internally clamped hv bushing improves sealing, combats corrosion

Threaded porcelain bushings on Westinghouse pole-type distribution transformers are internally secured with a spring grip nut to eliminate external flanges and threaded studs. The spring follow action of this nut effectively seals the cork-neoprene gasket retained by the undercut porcelain. Cover bushings are mounted on a raised boss to assure water runoff.

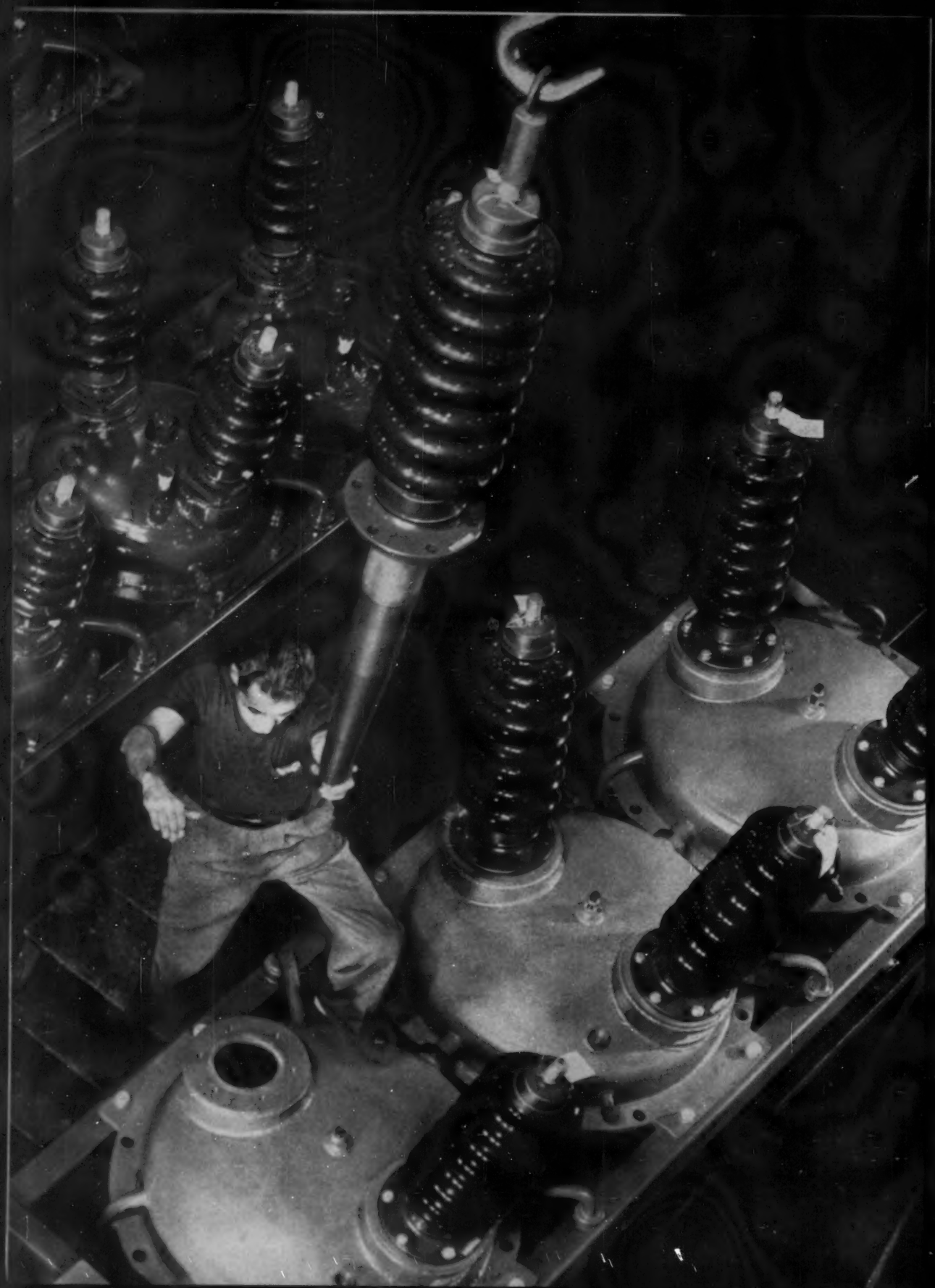
This is just one of the many design advances of the complete Westinghouse line that mean more for your transformer dollar.

• • •

For the complete facts, call The Man With The Facts, your Westinghouse Sales Engineer. Or write direct to Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-70745

YOU CAN BE **SURE**...IF IT'S

Westinghouse



Helping the industry meet its growing loads

Leading the shift to new ASA standards with proved bushing design

The electrical industry has pushed toward constantly increasing standardization of equipment for reasons based on many sound operating economies. The recent ASA bushing standards are fresh evidence of this trend.

Westinghouse has recognized its responsibility to the industry in meeting these standards—with products of proved reliability—with the least amount of delay.

As a result, Westinghouse circuit breakers and transformers are the first available to the industry equipped with a bushing that fully meets the new standards. This bushing, the new Type S, retains the basic solder-sealed condenser construction backed by over 750,000 bushing years of service. It incorporates only minor dimensional changes over the previous design.

This quick response to industry needs is another record achievement of which we are proud and one which we believe reflects the long-term soundness of Westinghouse design aimed at meeting America's growing electrical load —economically—efficiently. J-97185

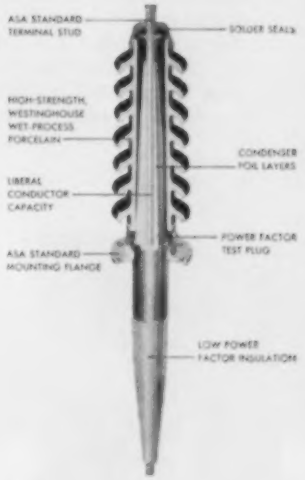
YOU CAN BE SURE...IF IT'S Westinghouse

Industry interchangeability reduces spare parts inventory

Type S condenser bushings, now available, are designed to meet ASA mechanical standards for 23 kv through 69 kv, 400- and 1200-ampere ratings.

Basic design features unchanged

Condenser construction, pioneered by Westinghouse and backed up by over 50 years of experience, uniformly distributes voltage to prevent a concentration of stress at any one point. Complete hermetic seal, formed by soldering porcelain to flange and cap, eliminates all gaskets to assure a permanent seal against external contamination.



Now available

Westinghouse manufactures condenser bushings, from stud to porcelain, under closely controlled conditions using the most modern techniques. For best service, be sure to insist on them when purchasing breakers or transformers.

For more information, call your nearby Westinghouse representative or write direct to Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pa.

NEWS ABOUT PEOPLE

DR L. R. HAFSTAD

Dr Hafstad Named GM Official

General Motors Corp has elected Dr Lawrence R. Hafstad, a leading atomic energy scientist, a vice president. Director of the GM Research Staff, he succeeds Charles L. McCuen, who has retired after 29 years with the company.

Dr Hafstad was named the first director of Atomic Energy Commission's Division of Reactor Development in 1949. Under his guidance the nation's first electrical power was produced from nuclear fuel at the National Reactor Testing Station.

Since January of this year he has been director of Chase Manhattan Bank's Atomic Energy Division. Under sponsorship of the Fund for Peaceful Atomic Development Dr Hafstad visited India, Turkey, Italy, Switzerland, France, Belgium, and Great Britain this spring in behalf of peaceful uses of atomic energy.

Rockbestos Elects Redway President

A. S. REDWAY

Albert S. Redway has been elected president of Rockbestos Products Corp, New Haven, Conn. He succeeds Carl B. Ely who has retired from that office.

Redway was president of American Paper Goods Co from 1949 until it was acquired by Continental Can Co last year. Since then he has been serving as general manager of research and development for Continental Can's Paper Container Division. Redway is also president of Manufacturers' Association of Connecticut.

Ely was Rockbestos' vice president for 33 years before assuming the presidency this year. He continues as a director and vice president of Rockbestos and a director of Consolidated Coppermines Corp, major owner of Rockbestos.

C. E. BITZER

Bitzer Heads Sales at Anderson Brass

Anderson Brass Works, Inc, of Birmingham, Ala., has named C. E. Bitzer general sales manager to replace Robert D. Cleaves who has resigned.

Bitzer was division manager for Consumer Product Sales with Westinghouse Electric International Co in 1953 when he accepted the post of assistant to the general sales manager at Anderson Brass.

Cleaves served as sales manager for Line Material Co's Protective and Power Switching Division before joining Anderson as general sales manager a year ago.

PERSONAL BRIEFS

J. Harry Lucas, manager of Washington Water Power Co's Spokane Division since 1953, has been named manager of the utility's newly formed department of personnel and industrial relations. Lucas is succeeded by **George Brunzell,** plant manager, Spokane Division, since 1946.

H. F. Sanders, secretary and treasurer of Middle South Utilities, Inc, has accepted chairmanship of Public Utilities Division, Travelers Aid Society of New York.

Oscar L. Rice has been promoted to chief of the dams branch of Bureau of Reclamation's engineering headquarters at Denver. Previously assistant chief design engineer, Rice succeeds **John Hammond** who has retired to open engineering consultant offices in Denver.

Charles Tatham has joined Bache & Co as head of the research department's public utilities division. Previously vice president of Institutional Utility Service, Inc, Tatham has been a public utility specialist for 23 years.

James L. Grahl has been appointed head of American Public Power Association's Atomic Energy Service. Previously he was with Budget Bureau's Atomic Energy Section.

(*More Personal Briefs on page* 39)

TRAFFIC COP FOR 400,000 KVA

Contactors, the "traffic cops" in load-tap-changing equipment, are now available for typical regulating transformers rated as high as 400,000 kva. That's a whopping increase over the previous limit of about 150,000 kva.

It's all due to G.E.'s new oil-blast contactor—six years in development—thoroughly tested. Even under the maximum short circuit which might be imposed at the transformer terminals, this "traffic cop" will successfully divert current from the tap selector, permitting a tap change to be completed.

Already in use on the new 194,775-kva, 138-kv regulating and phase-changing transformer recently installed by Commonwealth Edison Company, these new contactors represent a major advance in power transformer design. General Electric Co., Schenectady 5, New York. 421-36

Power Transformer NEWS

Progress Is Our Most Important Product

GENERAL ELECTRIC

THESE ARE FOG-TYPE SUSPENSION INSULATOR PORCELAINS

Thirty years ago the Lapp Fog-Type suspension insulator was designed. It is the still-vital ancestor of hundreds of designs built by Lapp on the same principle of exposed multiple short petticoats for contamination duty.

During the years before, and since, this design was first used, dozens of "new ideas" for the handling of dirt conditions have been offered—and withdrawn. Among them all, the Lapp Fog-Type unit is the only design which has won wide acceptance, and has survived without serious challenge for so long a period.

What makes the difference? The fact is that most insulator design has been seriously limited by manufacturing expediency. Line operating requirements have always had to be compromised by production facility and proficiency. Seldom has the consideration of "this design will do the best insulating job" been as important as "this design is feasible of manufacture."

At Lapp, it's different. Born of Lapp's long record of production of "special porcelains" of many sizes and shapes . . . of many electrical and mechanical requirements . . . there has here developed a mastery of a variety of production and control techniques unduplicated in the ceramic industry. Less than elsewhere, are Lapp designers limited by production restrictions as to shape, size and proportion of porcelain parts, or mechanical assembly.

The Lapp Fog-Type suspension unit, and subsequent Line Post and Station Post designs, were based solely on service requirements. Lapp facilities were available for their manufacture on an efficient routine-production basis. For 30 years they have been proving their merit. Like all Lapp line insulators, and Lapp porcelain components, they offer an extra margin of operating security, long life, low upkeep.

Lapp Insulator Co., Inc., Le Roy, N. Y.

Lapp

PERSONAL BRIEFS

Continued from page 36

Bonneville Power Administration's director of operations and maintenance, **N. H. Callard,** has announced retirement plans. Callard, who resigned under doctor's orders, remains on active duty for another month until Administrator William A. Pearl names a successor.

Robert O. Feddersen has been named customer service manager, Phoenix Division, Arizona Public Service Co . . . **Miss Fern Brannen** has been appointed home service director for Southwestern Public Service Co.

Philadelphia Electric Co has designated **Wilson Grant** superintendent of the recently formed Materials Control Division. Associated with the utility since 1916, Grant was a cost supervisor at the time of this promotion.

Elmer B. Heise has been named Northern Indiana Public Service Co manager of electric production succeeding the late **Frank L. Reinmann.**

Westinghouse Electric Corp has designated **H. E. Hugo** southwestern regional manager for portable appliances. Promoted from Pacific Coast regional sales promotion manager for appliances, Hugo succeeds the late **C. E. Reid** . . . Motorola, Inc, has announced appointments for its transistor manufacturing operations at Phoenix, Ariz.: **John T. Hickey** has been named general manager; **Dr Virgil E. Bottom,** director of research and development; and **Edmund G. Shower,** product production manager of the operations.

Harza Engineering Co, Chicago, has appointed **Arthur P. Geuss** vice president and chief engineer and **C. Keith Willey** vice president and western manager. Since 1954 Geuss has been chief engineer and Willey, western manager.

James G. Thomas has been promoted from field engineer to sales manager of T. J. Cope, Inc . . . Babcock & Wilcox Co has named **Carl Claus** director of staff. Previously executive assistant in charge of manufacturing and sales for B&W's Refractories Division, Claus will coordinate the company's staff functions . . . Combustion Engineering, Inc, has promoted **Carmine J. Grossi** from assistant general sales manager to manager of Export Division. **Frank J. Bader,** San Francisco district manager, fills Grossi's former post.

OBITUARY

Joseph E. Elliott, 53, general commercial manager for Southwestern Gas & Electric Co since 1947, died in Shreveport, La. He was a charter member and a past president of Petroleum Electric Power Association.

Earl Elowsky died at Hillman, Mich. As "the one-man utility" (EW, Dec 7, 1953, cover), he was owner of Hillman Light, Power & Water Co for many years until the utility was sold to Alpena Power Co last January.

Andrew E. Papp, 48, executive vice president of G&W Electric Specialty Co, died in Chicago, Ill. As chief engineer of G&W he was responsible for many developments in high voltage cable devices.

BPA Digital Test Solves Load-Flow Problems

Successful test study has been made in applying a digital computer to load-flow problems on a large power system network by engineers of Bonneville Power Administration, Portland, Ore. This test study is believed to be the first successful application of digital computers to such problems.

In the study, use was made of the junction analysis method to obtain an iterative type of solution capable of rapid convergence (EW, April 18, 1955, p 115). Contributing to success of the study was the use of a procedure called the "method of steepest descents."

Test study was made in the IBM service bureau in Los Angeles on an IBM 650 computer. This is a standard 2,000-word, general-purpose, high-speed computer using a program capable of solving a 50-bus problem. In setting up the study, loads and generation were specified at all buses except one. One voltage was specified in magnitude and phase, and others were specified in magnitude only or held within certain limits.

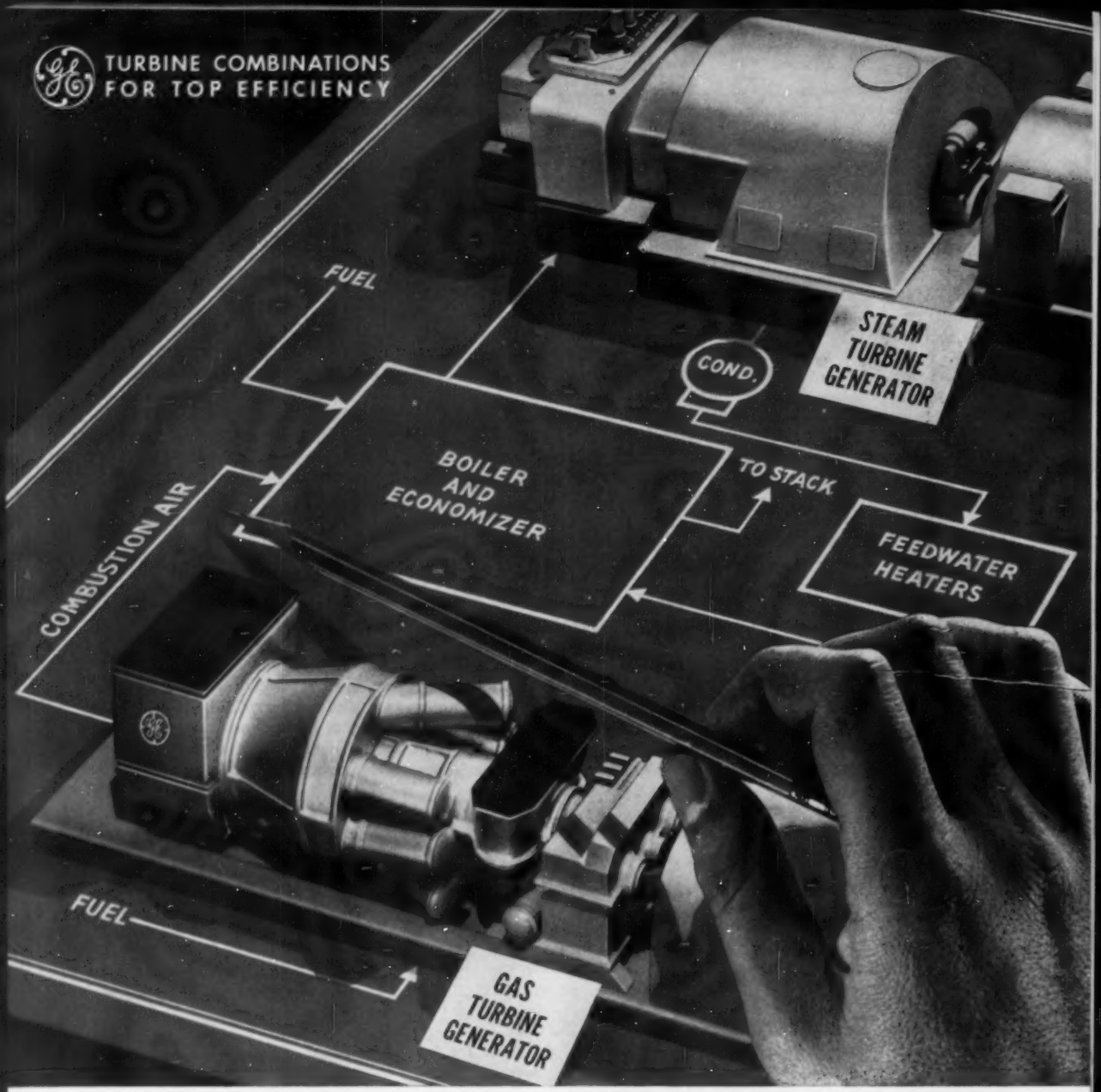
The computer took the specified data together with system configuration and constants and operated on them mathematically by many repeated operations to obtain the bus voltages under the given conditions. Four solutions under different load conditions were obtained for a 13-bus problem.

Method of steepest descents is a successive approximation device for solving sets of linear or non-linear equations. This procedure indicates residual error. A magnitude of correction to be applied must be approximated. To help overcome this hurdle, BPA engineers have devised a method which automatically chooses the appropriate correction magnitude.

Upon completion of the test study, Bonneville announced the program was being expanded to handle a system of 100 buses and 170 lines. Use of a digital computer in these studies allows the solution of load flow over a complex network with a minimum of effort and very high accuracy. Data for the studies may be used directly without excessive processing required for other digital or conventional analyzer procedures. In addition, solutions may be obtained very rapidly.

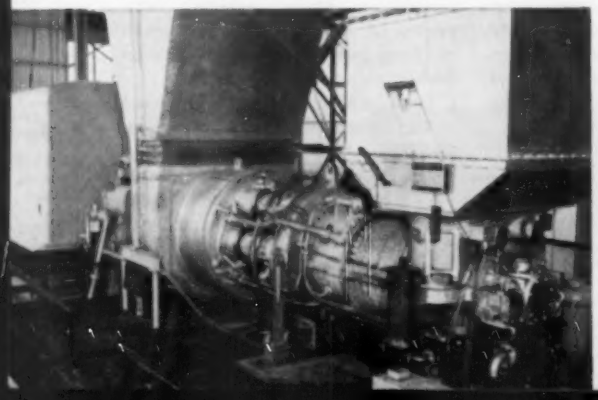
Digital studies of the type completed by BPA are expected to be particularly important in the comparison of relative efficiencies of alternate transmission plans. Accurate comparison of system transmission losses has been beyond the ability of even the best network analyzers.

The digital method has been found useful in the derivation of system loss coefficients (EW, June 15, 1953, p 129). Following derivation of these loss factors, a system may be designed and operated for optimum economy of available energy resources.



EXAMPLE OF GAS TURBINE used in a combined gas-steam turbine cycle is shown below installed at a Southwestern utility. Use of gas turbine exhaust for feed-water heating resulted in 15% improvement in station heat rate.

G-E GAS TURBINE PLANT shown below is devoted exclusively to the development and manufacture of commercial gas turbines. General Electric gas turbines have over 730,000 hours of operation to their credit—a world's record.



EFFICIENCY GOES UP when this G-E steam turbine-gas turbine team goes into action. Here, exhaust gas from gas turbine is used as combustion air for steam boilers. Result is 7.5% improvement in system efficiency

NEW WAY TO IMPROVE HEAT RATE:

G-E gas turbine exhaust used as boiler combustion air

When combined with a steam turbine in a generating plant, the G-E gas turbine can make a significant contribution towards over-all electric generating station efficiency and resulting economy.

IN THE EXAMPLE AT LEFT, exhaust gas from the G-E gas turbine, which retains over 80% of its original oxygen, is used as preheated combustion air for fuel-fired steam boilers. The gas turbine itself drives a generator in parallel with the main turbine-generator.

TAKE A 6000-KW GAS TURBINE, for example. It provides all the combustion air required for a boiler supplying 1250-psig, 950 F steam for a 40,000-kw condensing steam turbine. Net heat rate for such a plant would be 10,760 Btu/kwh as contrasted to 11,630 Btu/kwh for a steam plant without a gas turbine. The improvement is 7.5 per cent.

IN DOLLARS AND CENTS, that represents a $60,000 per year saving as a result of using a gas-steam turbine cycle (based on 70% plant factor, 15% gross fixed charges, and 25¢/million Btu for fuel).

SIMILAR ECONOMIES ARE obtainable with other gas-steam turbine cycles. For details on the arrangement most useful to you, contact your G-E Apparatus Sales Representative, or write for Bulletin GER-1026. Address Section 261-5, General Electric Company, Schenectady 5, New York.

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- *LOWEST LONG-TIME CREEP RATE;*
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MEETINGS CALENDAR

SEPTEMBER

EDISON ELECTRIC INSTITUTE—Purchasing and Stores Committee, EEI Headquarters, New York, Sept. 26; Transmission and Distribution Committee, Jung Hotel, New Orleans, Sept. 29-30.

SYMPOSIUM ON ELECTRONIC AUTOMATION—University of Pennsylvania, Irvine Auditorium, Philadelphia, Sept. 26-27.

***AMERICAN MANAGEMENT ASSOCIATION**—Fall Personnel Conference, Hotel Statler, New York City, Sept. 26-28.

ASSOCIATION OF IRON AND STEEL ENGINEERS—Annual Convention, Hotel Sherman, Chicago, Sept. 26-29.

ATOMIC INDUSTRIAL FORUM, INC—1st Trade Fair, Sheraton-Park Hotel, Washington, D. C., Sept. 26-30.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—Industrial Electronics Conference, Rockham Memorial Auditorium, Detroit, Sept. 28-29.

PENNSYLVANIA ELECTRIC ASSOCIATION—Transmission and Distribution Committee, Fort Bedford Inn, Bedford, Pa., Sept. 28-30.

STANDARD ENGINEERS SOCIETY—4th Annual Meeting, Hotel Statler, Hartford, Conn., Sept. 29-Oct. 1.

OCTOBER

***PENNSYLVANIA ELECTRIC ASSOCIATION**—Hydraulic Power Committee, Fall Meeting, Skytop Lodge, Skytop, Pa., Oct. 3-4; Meter Committee, Bedford Springs Hotel, Bedford, Pa., Oct. 13-14; Systems Operation Committee, Hotel Harrisburger, Harrisburg, Pa., Oct. 20-21; Prime Movers Committee, Clearfield, Pa., Oct. 20-21; Electrical Equipment Committee, Hotel New Yorker, N. Y., Oct. 27-28; Relay Committee, Pocono Manor Inn, Pocono Manor, Pa., Oct. 31-Nov. 1.

EDISON ELECTRIC INSTITUTE—Meter and Service Committee, Hotel Syracuse, Syracuse, N. Y., Oct. 3-5; Prime Movers Committee, Hotel Cleveland, Ohio, Oct. 3-5; Area Development Workshop, Sheraton Hotel, St. Louis, Mo., Oct. 5-7; Electrical Equipment Committee, Shoreham Hotel, Washington, Oct. 17-18.

NATIONAL ELECTRONICS CONFERENCE, INC—Hotel Sherman, Chicago, Oct. 3-5.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—Fall General Meeting, Morrison Hotel, Chicago, Oct. 3-7; Application of Motors to Space Heating and Cooling Equipment Conference, Chase Hotel, St. Louis, Mo., Oct. 19-20.

ELECTRIC COMPANIES PUBLIC INFORMATION PROGRAM—Workshop Conference, Chase-Park Plaza Hotels, St. Louis, Mo., Oct. 5-7.

INDIANA ELECTRIC ASSOCIATION—Annual Convention, French Lick Spring Hotel, French Lick, Ind., Oct. 5-7.

MISSOURI VALLEY ELECTRIC ASSOCIATION—Sales & Rural Conference, President Hotel, Kansas City, Mo., Oct. 5-7.

CANADIAN ELECTRICAL MANUFACTURERS' ASSOCIATION—11th Annual Meeting, Sheraton-Brock Hotel, Niagara Falls, Ontario, Canada, Oct. 5-7.

INTERSTATE POWER CLUB—Hotel Martinique, New York, Oct. 10.

IOWA UTILITIES ASSOCIATION—8th Annual Management Conference, Hotel Fort Des Moines, Des Moines, Iowa, Oct. 10-11.

***AMERICAN SOCIETY OF MECHANICAL ENGINEERS**—Lubrication Conference, Hotel Antlers, Indianapolis, Ind., Oct. 10-12.

OKLAHOMA UTILITIES ASSOCIATION—Eastern Electric Light & Power Division, Okmulgee, Okla., Oct. 13; Western Electric Light and Power Division, Norman, Okla., Oct. 14; Accounting Section, Lawton, Okla., Oct. 21.

NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS—Fall Meeting, Peabody Hotel, Memphis, Tenn., Oct. 14-15.

AMERICAN WELDING SOCIETY—National Fall Meeting, Bellevue-Stratford Hotel, Philadelphia, Oct. 17-21.

NATIONAL INDUSTRIAL CONFERENCE—Board Meeting, Waldorf-Astoria Hotel, New York, Oct. 20; Special Atomic Energy Conference, Waldorf-Astoria Hotel, New York, Oct. 26-28.

NORTHWEST PUBLIC POWER ASSOCIATION—Power Use Section, Seattle City Light Auditorium, Oct. 20-21.

SOUTHEASTERN ELECTRIC EXCHANGE—Accounting Conference, Hotel San Carlos, Pensacola, Fla., Oct. 20-21; Sales Conference, Biltmore Hotel, Atlanta, Ga., Oct. 27-28.

THE UNIVERSITY OF TEXAS—8th Annual Power Distribution Conference, Austin, Oct. 24-26.

NATIONAL ASSOCIATION OF RAILROAD AND UTILITIES COMMISSIONERS—67th Annual Convention, Grove Park Inn, Asheville, N. C., Oct. 24-27.

NOVEMBER

NATIONAL ASSOCIATION OF CORROSION ENGINEERS—Northeast Region Fall Meeting, Hotel Niagara Falls, New York, Nov. 1-3.

ASSOCIATION FOR APPLIED SOLAR ENERGY—World Symposium on applied solar energy, Westward Ho Hotel, Phoenix, Ariz., Nov. 1-5.

EDISON ELECTRIC INSTITUTE—Taxation Accounting Committee, sponsored jointly by American Gas Association, Plaza Terrace Hotel, Cincinnati, Ohio, Nov. 3; Accident Prevention Committee, Beaumont Hotel, Beaumont, Tex., Nov. 13-18; Industrial Relations Committee, Joint Meeting with New England Personnel Group, Somerset Hotel, Boston, Nov. 17-18.

PACIFIC COAST ELECTRICAL ASSOCIATION—Business Development Section, Annual Conference, Huntington-Sheraton Hotel, Pasadena, Calif., Nov. 3-4; Hawaiian Section Conference, Honolulu, Nov. 9-10; Administration Services Section Meeting, California Hotel, Fresno, Calif., Nov. 16-17.

***AMERICAN SOCIETY OF ELECTRICAL ENGINEERS**—Eastern Joint Computer Conference, Hotel Statler, Boston, Nov. 7-9.

INDUSTRIAL MANAGEMENT SOCIETY—19th Annual Time and Motion Study and Management Clinic, Sherman Hotel, Chicago, Nov. 9-11.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS—Diamond Jubilee, Congress, Hilton & Blackstone Hotels, Chicago, Nov. 13-18.

NATIONAL ELECTRICAL MANUFACTURERS' ASSOCIATION—Annual Meeting, Traymore Hotel, Atlantic City, Nov. 14-18.

CHICAGO EXPOSITION OF POWER & MECHANICAL ENGINEERING—Chicago Coliseum, Nov. 14-18.

WISCONSIN UTILITIES ASSOCIATION—Electric & Gas Section, Schroeder Hotel, Milwaukee, Nov. 21-23.

INTER-INDUSTRY FARM ELECTRIC UTILIZATION COUNCIL—2nd Annual National Power Use Workshop, Chase & Park Plaza Hotels, St. Louis, Mo., Nov. 28-30.

AIR CONDITIONING & REFRIGERATION INSTITUTE—9th Air Conditioning & Refrigeration Exposition, The Auditorium, Atlantic City, N. J., Nov. 28-Dec. 1.

DECEMBER

NATIONAL ASSOCIATION OF COST ACCOUNTANTS—Fairmount Hotel, San Francisco, Dec. 2-3.

AMERICAN WATERSHED COUNCIL, INC—Second National Watershed Congress, Statler Hotel, Washington, D. C., Dec. 5-6.

INTERNATIONAL EXPOSITION—25th Exposition of Chemical Industries, Convention Hall, Philadelphia, Pa., Dec. 5-9.

(Continued on page 44)

Meetings Calendar

(*Continued from page 43*)

ENGINEERS JOINT COUNCIL—Nuclear Engineering & Science Congress, Public Auditorium, Cleveland, Dec. 12-16.

EDISON ELECTRIC INSTITUTE—Industrial Relations Committee, EEI Headquarters, N. Y., Dec. 15.

JANUARY 1956

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—Winter General Meeting, New York, Jan. 30-Feb. 3.

FEBRUARY

EDISON ELECTRIC INSTITUTE—National Industrial Electric Heating Conference, Netherland Plaza Hotel, Cincinnati, Feb. 6-10.

AMERICAN SOCIETY FOR TESTING MATERIALS—Committee Week, Hotel Statler, Buffalo, Feb. 27-March 2.

MARCH

***NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION**—Edgewater Beach Hotel, Chicago, March 12-16.

ILLINOIS INSTITUTE OF TECHNOLOGY—18th Annual American Power Conference, Hotel Sherman, Chicago, March 21-23.

APRIL

ELECTRICAL MAINTENANCE ENGINEERS ASSOCIATION—8th National Biennial Electrical Industry Show, Shrine Exposition Hall, Los Angeles, Calif., April 5-7.

*** GREATER NEW YORK SAFETY COUNCIL**—26th Annual Safety Convention & Exposition, Hotel Statler, New York City, April 16-20.

*** AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS**—2nd Conference on Recording & Controlling Instruments, Bradford Hotel, Boston, April 26-27.

*Additions this week.

Neptune & Co Ride Seattle Light's Float

Float sponsored by Seattle City Light was chosen to bear the top dignitaries, King Neptune VI and his prime minister, in the six parades which were part of the recent 1955 Seafair celebration in Seattle.

Decorations for the float included papier-mache dolphins cavorting on a simulated sea complete with sea shells and ladies on the beach. More than 500,000 saw the parades in which the float appeared. It was the second consecutive year that Seattle City Light had sponsored the main Seafair parade attraction.

EEI Committee Schedules Area Development Meet

Union Electric Co of Missouri will be host to Edison Electric Institute's area development workshop, scheduled to be held Oct. 10-12 at Sheraton Hotel, St. Louis.

Talks on selected topics will be followed by roundtable discussions at the workshop, sponsored by EEI's area development committee. Discussion topics were selected by a poll of the committee.

Among other speakers, J. W. McAfee, president of Union Electric, will speak on "The Collateral Advantages of Area Development." EEI has credited Union Electric as conducting a successful community development program for several years.

PIP Workshop to Offer 'Face the Facts' Theme

"Let's Face the Facts" is the theme for the 1955 electric companies' Public Information Program workshop conference. A down-to-earth program keyed to this theme has been forecast by Conference Chairman R. D. Furber of Northern States Power Co.

Harllee Branch, Jr, president of Edison Electric Institute and Georgia Power Co, will be a speaker at the conference, scheduled Oct. 5-7 at Chase-Park Plaza Hotels, St. Louis.

Electric industry panelists will review arguments used by public power advocates, present case histories on how their companies handle public relations problems, and reveal 1956 plans for implementing national public relations objectives of the industry.

Premier Bulganin Scores Heavy Soviet Equipment

Premier Nikolai Bulganin called on the Soviet's electrical equipment industry to reduce size and weight of transformers and generators to that of similar units manufactured in other countries.

In a speech quoted by Izvestia, official Soviet newspaper, Bulganin charged that Moscow Transformer Works built a 123,500-kva transformer weighing 50% more than a similar Swedish unit. The slowness of the Ministry of Electrical Equipment in introducing silicone-organic insulation in manufacture of electrical machinery was noted by the Premier.

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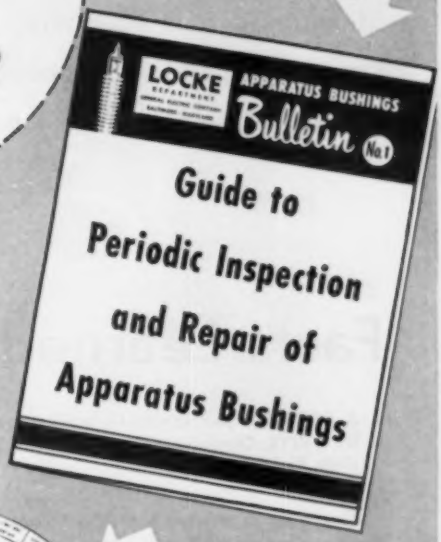
If your job involves apparatus bushings . . .
you'll find this new 6-page booklet very useful. Up-to-date, authoritative.



If your job involves switch & bus insulators . . .
the Cantilever Strength Estimators make it easy for you to determine cantilever load applicable to upright or underhung cap and pin type Switch & Bus Insulators, at various distances beyond the free end of their mounting.

The Switch & Bus Insulator Selector is a specially designed, easy-to-use circular slide chart. With it, you can quickly determine the mechanical and electrical characteristics of an insulator stack for any given operating voltage or BIL.

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Water Quality Satisfactory,
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Constant Operation Unnecessary,
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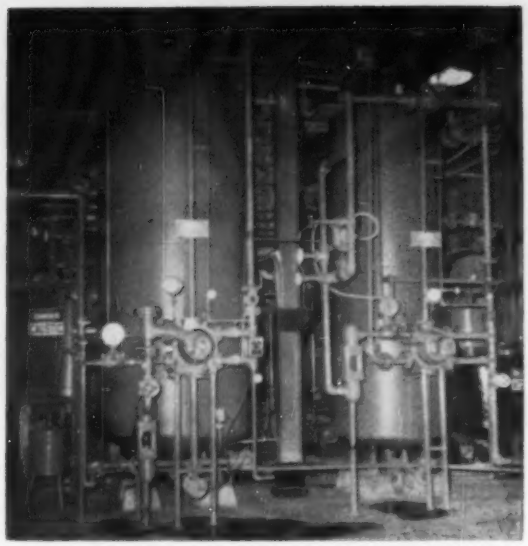


Facts Learned about Demineralization

J. A. WALLACE, Asst General Production Manager,
L. W. WHITE, Chemical Engineer, Iowa Electric Light & Power Co, Cedar Rapids, Iowa

Five years experience with a two-stage, 40-gal per min demineralizer at the Prairie Creek Station of Iowa Electric Light & Power Co indicated that:

1. Constant pH check of the demineralizer effluent gives good indication of water quality.

2. Manual regenerating controls are adequate on small units where boiler makeup is small.

3. A small demineralizer need not run more than 8 hr every other day.

4. Proper instrumentation is absolutely necessary.

Based on $3.70 per cwt for sulfuric acid and $5.45 per cwt for caustic soda, the cost of demineralized water is 42¢ per thousand gallons for regenerating chemicals. This is considerably higher than the theoretical value, but not unusual because the cation and anion units are not regenerated at full capacity. The demineralizer is operated on a gallonage basis rather than by tests as the cost per kw is only slightly affected.

Running the units to capacity once every 6 months indicates that they are not losing capacity. They are well above predicted capacity, and there has been very little, if any, attrition or backwash loss of resin. From 325,000 to 350,000 gal per cu ft of resin have been demineralized with 831 cation and 143 anion regenerations.

Experience indicates that ample storage capacity for demineralized water and sufficient cation water for one complete anion regenerating cycle are preferred for the regeneration of the anion exchanger rather than dependence on the cation effluent straight from the degasifier. Another advantage is that the demineralizer can be put into service at rated capacity. This usually gives better quality water.

There has been no indication that demineralized water has had detrimental effects on the boiler. Turbine efficiency has been normal with no loss in capacity. A thin film of caustic deposited on the turbine blading in about 3 years was easily removed with high-pressure water spray.

Recording both anion and cation effluent conductivity is unnecessary in manually controlled demineralizers because they are used only for control purposes, particularly when the units are being regenerated.

Most important quality indicating device is the pH recorder, the cell of which is in the anion effluent. Low pH value indicates exhaustion of either bed as well as silica leakage. Interlocks should be provided between the pH recorder and the mechanism which keeps the demineralizer in service so that the unit can be taken out of service if pH value goes below or above predetermined values.

Automatic controls present a considerable problem. Wiring on automatic control units is very complicated and requires hours of study if an unusual problem arises. However with manual controls very little, if anything, can happen that the average operator cannot find and correct.

Demineralizer Operating Costs

Prairie Creek Station	*Pounds per 1,000 gal*	*Cents per pound*	*Cents per 1,000 gal*
Sulfuric acid	6.61	3.70	25.00
Caustic soda	2.95	5.45	17.07
Total			42.07
Boone Station			
Sulfuric acid	10.2	1.425	14.53
Caustic soda	7.4	8.590	63.49
Total			78.02

Adapted from a paper presented by the authors at the American Power Conference, March 30, 31 and April 1, 1955, at Chicago, Ill.

America's Finest Porcelain...

for Special Applications...

VICTOR

Purified Porcelain

Victor "know-how" has made many contributions to insulator progress. None is as important as *Purified* Porcelain. By instituting demineralization of water, modern microscreening, infrared drying, black light inspection, continuous electrical testing and many other advances, VICTOR gives you the finest insulator porcelain ever made!

VICTOR *Purified* Porcelain is ideal for special applications such as molded, extruded, and turned shapes. It has vastly greater uniformity in mechanical and electrical strength values, higher puncture voltage values, greater density, hardness and durability.

Our engineering, design and manufacturing facilities are ready to help you with specialized insulator problems. Write us.

FEATURES OF PURIFIED PORCELAIN

- Greater hardness and density
- Greater resistance to impact
- Greater thermal resistance
- Higher average puncture values
- Higher mechanical strength
- Takes a smoother, harder glaze
- Uniformity of quality available in no other porcelain

For the full facts on VICTOR "know-how," write for "The Story of Victor and Purified Porcelain." For engineering data on Victor's complete line of standard transmission and distribution insulators, write for Bulletin No. 4.

NEWS FROM VICTOR

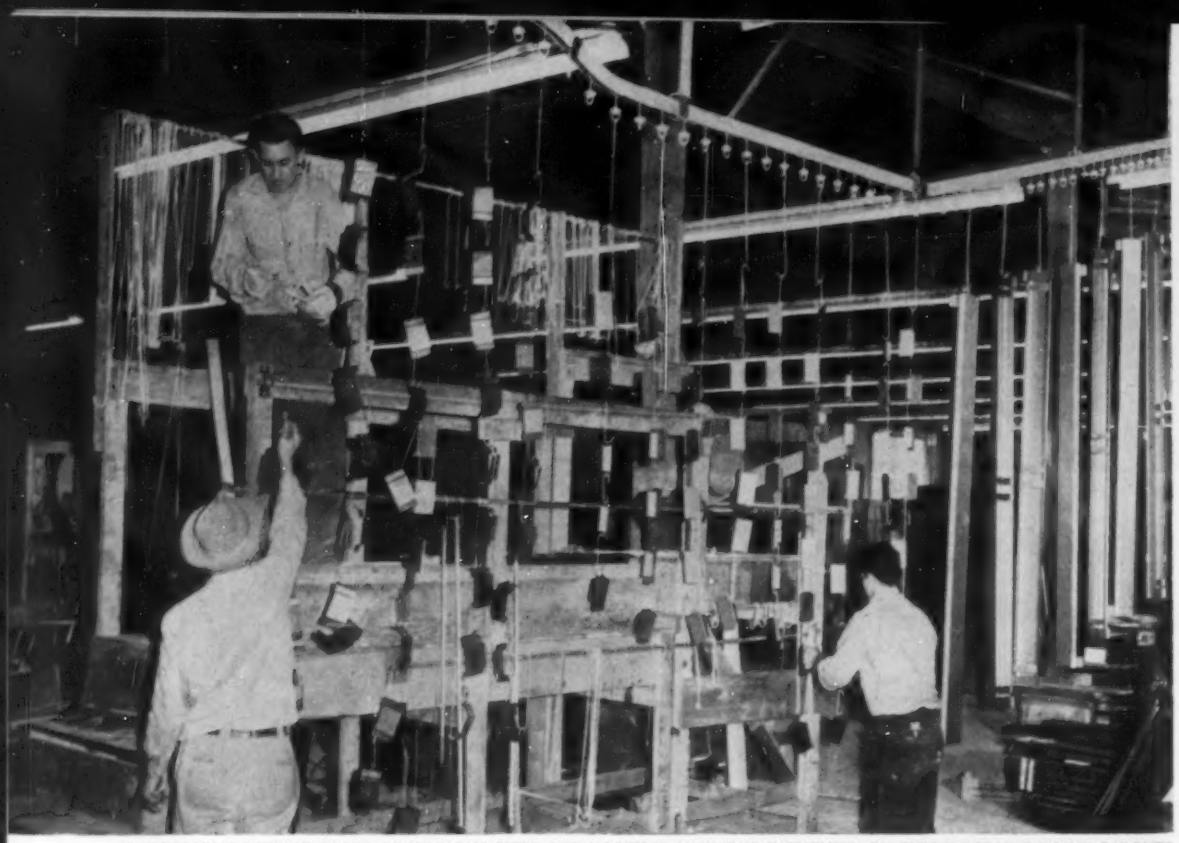
With the completion of a brand new addition to its plant last year, Victor has almost doubled the area devoted to bushing and special porcelain manufacture. The new building was made necessary by increasing demands for special porcelain shapes made of Purified Porcelain.

SPECIFY VICTOR

Purified Porcelain Special Insulators

VICTOR INSULATORS DIVISION
I-T-E CIRCUIT BREAKER CO.
VICTOR, N. Y.

Low and High Voltage Pintypes • Suspensions • Guy Strains
Spools • Switch and Bus Insulators • Custom Designed Porcelain
Insulator Hardware



FLUORESCENT FIXTURE PARTS OF VARIOUS SIZES ARE HANDLED WITHOUT DIFFICULTY BY ELECTROSTATIC PAINT SPRAYER

Electrostatic Painting Ups Production

INDUSTRIAL Design

Light fixture manufacturer finds new method reduces work crew from 14 to 2 men and paint consumption from 180 to 75 gal a day

R. H. SHAFFER, Works Manager, Fluorescent Fixtures of California, South San Francisco, Calif.

Spray painting fluorescent light fixtures with electrostatic equipment has cut the number of painters needed in a finishing operation from 14 to 2. It has cut also paint consumption from 180 gal per day to 75 and has stepped up production substantially.

Fluorescent Fixtures of California installed the painting equipment in a new plant. The result has been a uniform manufacturing operation credited with raising output to 110% that of the old plant.

These are the virtues of a carefully designed manufacturing layout having adequate space:

- Savings were realized at once in better material handling equipment and better working conditions.
- Some savings in labor and materials were also realized through automatic cleaning and phosphatizing equipment.
- But the biggest single saving was in the spray-painting department.

Of the three principal steps in making fixtures, cleaning and finishing are perhaps the most important. Although good metal fabrication and accurate assembly are essential, the finishing operation bestows sales appeal.

The criteria leading to selection of spray painting were these:

- The baked white enamel reflecting surface should have a high reflectivity, durability, and uniformity.
- It should stand up in service.
- It should be economical.

Quality metal preparation is important to the final finish. So a conveyorized multiple stage washer for phosphatizing was designed to handle parts up to 10 ft long hung vertically. A capacity of 15 tons of sheet metal per shift was provided.

It was obvious that quantities of paint were being lost in the hand-spray process, and the entire production depended upon the skill and availability of 14 spray men, seven each shift, who worked in front of a 24-ft-long water-wash spray booth.

It was feared that electrostatic spray painting would not tolerate the wide variation of parts unless parts were heavily batched. This would have been a handicap, for many of the parts are 8 ft long and others are a mere inch or so square. It was desirable that these parts be hung on one line and intermingled occasionally.

This seemed an insurmountable obstacle, but just at that time Ransburg Electro-Coating Corp modified its No. 2 Process. A reciprocating disc was substituted for the original paint-

slinging bell. Increased flexibility of this design enabled parts of different shapes and sizes to be intermixed on the conveyor with a minimum of adjustments to the painting machine.

The modified No. 2 Process was installed in the new plant, and within four weeks production was 10% higher than at the former plant. Only two painters were needed instead of 14.

The 425-ft-long conveyor (running at 6 ft a min) loops through the electrostatic spray painting zone. The loop is 66 in. in diam. Parts hang from simple "S" hooks or dangle from special "Christmas tree" types of workholders. Work is about 18 in. below the rotators.

A 25-in.-diam disc spinning at 900 rpm moves up and down in the loop's center at a speed of about 1 ft a sec. The parts turn twice in about a foot of travel so that all sides are exposed to the spray. The disc is charged to about 90,000 v dc, imparting a strong negative charge to the spray. The work is grounded and attracts the atomized paint. This fosters uniform coating and eliminates overspraying.

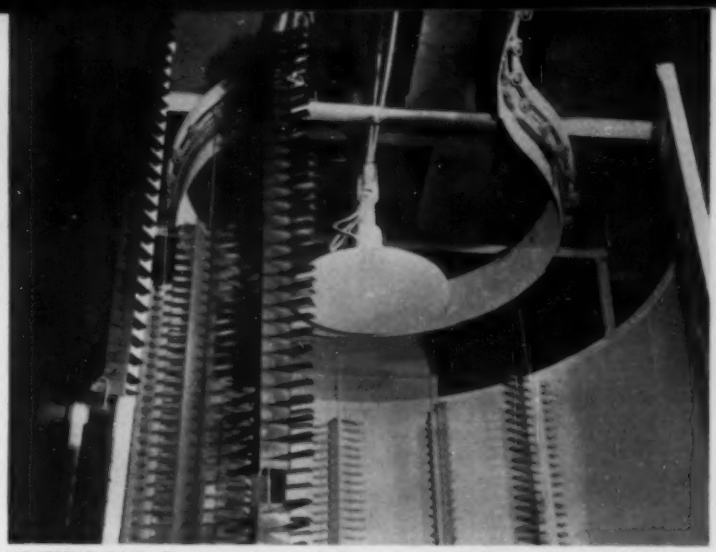
The power supply is a full wave doubler circuit having a 230-v, 3-phase input from a control panel. Its output is 100 kv dc at 2 ma superimposed on 70-v, 60-cps, 3-phase ac. Normal operating power ranges between 70 and 90 kw and can be adjusted at the control panel.

A squirrel cage induction motor develops 1/30 hp to drive the disc at 900 rpm. It is supplied with 3-phase 70-v, 60-cps power. This power has the high voltage superimposed upon it for charging the disc.

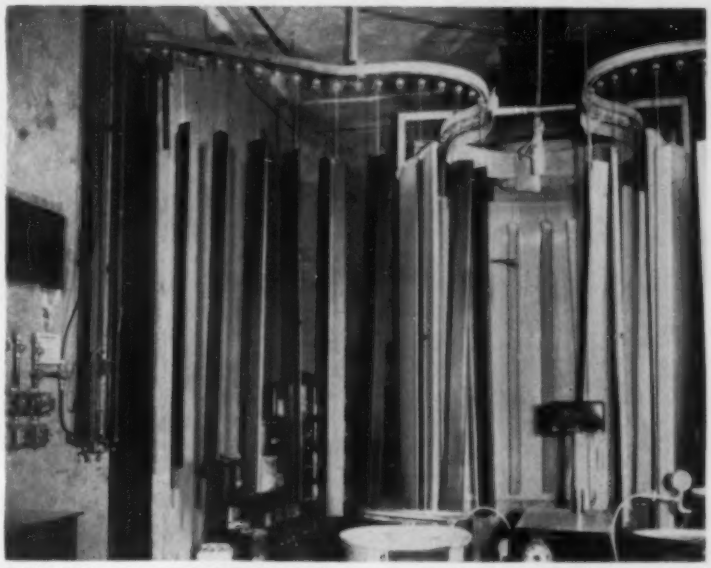
When shorter pieces are run through, the stroke length of the disc is adjusted with limit switches. Color changes are made by lifting the paint suction hose from one barrel of paint and dropping it into another. A 25-ft gap is left in the line so these operations can be done without stopping the conveyor.

The enamel paint is reduced 5 paint to 3 thinner to a viscosity of 17 seconds on a Zahn No. 2 cup. A noncirculating paint heater between metering pump and disc stabilizes morning and afternoon temperature of the paint at about 90F. Thus it is not necessary to make solvent adjustments during the day.

As much as possible, parts are hung to present the same square footage a minute, thereby making a change unnecessary in paint delivery. Often the painting room goes unoccupied, unobserved, and unattended.



WHIRLING DISC slings paint on 4-ft louvers, two high, as the conveyor loops around it. Disc climbs and falls, and parts rotate on conveyor during the operation



CONTROLS AT LEFT start conveyor, fan, electrostatic unit, and adjust length of reciprocation of disc. Paint pumping and metering unit is shown in the foreground

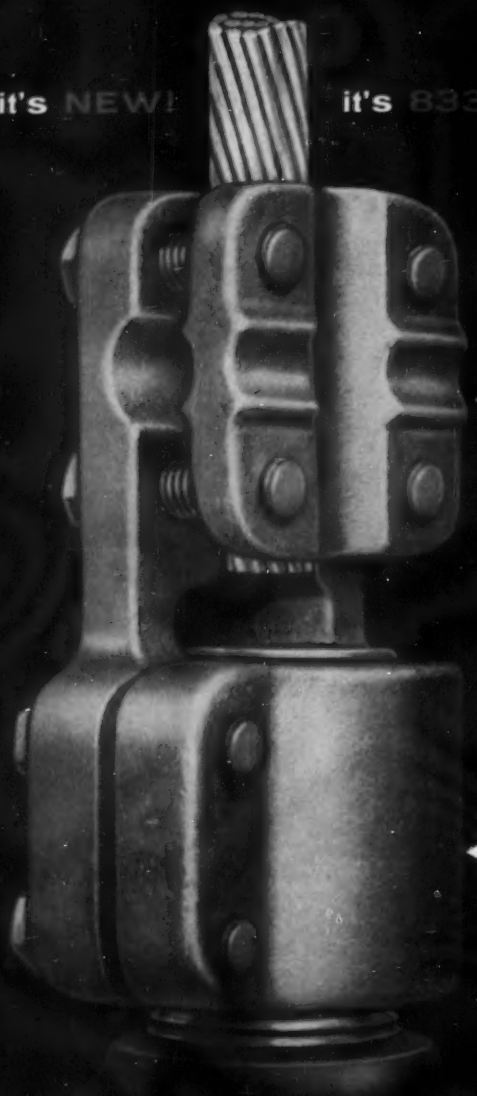
Having left the electrostatic zone, parts move in front of a 12-ft-long water-wash touch up booth where two men work when needed. Certain pieces having shielded areas require hand spraying for a proper finish. This is done at an upper and lower level. These two men work elsewhere when not needed to finish intricate parts.

After painting, parts pass through a flashoff zone and into an oven for baking at 300F for 12 min.

In addition to yielding perfectly coated parts "the first time," this new technique saved the company money by obviating a big water-wash spray booth. Electrostatic spray painting requires only the exhausting of solvent fumes. An auxiliary conveyor and spray booth (formerly planned for the two-coat painting of "egg crates") was eliminated because the electrostatic disc, plus touch up, did the job in only one pass.

Contracts already had been let when the new technique become available. But fast work and close cooperation between company engineers, manufacturers, and contractors, enabled the company to add this process in the eleventh hour. To date management has been satisfied.

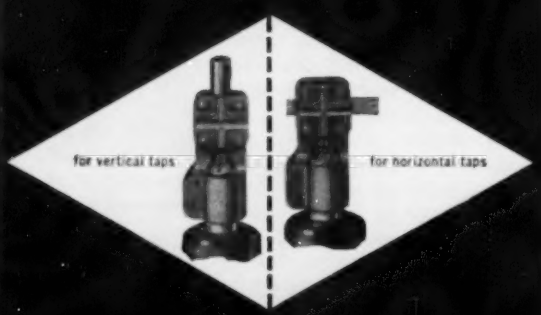
it's NEW! it's 833.33⅓% more versatile!



BURNDY RANGE-TAKING STUD CONNECTOR NDR—
12 sizes with the scope of a hundred . . . designed to meet E E I-NEMA specifications . . . to accommodate cable from #6 solid copper to 2,000 MCM copper; ⅜" copper I.P.S. to a 1¼" copper I.P.S. tubular bus and flat bar. Here's your chance to eliminate a lot of stock-keeping: these 12 items do the work of a hundred!

Constructed of high copper alloy, the NDR stud connector features a reversible cap that permits the full cable, flat bar, or tubular bus range to be taken either in line with the stud or at right angles to it.

Only one wrench is required for installation.



Write for Burndy advance catalog data sheet, Stud Connector Type NDR.

BURNDY

55-14

Norwalk, Connect. • Toronto, Canada • Factories: New York, California, Toronto • Export: Philips Export Company

ATOMIC POWER AND MECHANICAL QUIZ GAME WERE FEATURED IN WISCONSIN UTILITIES' STATE FAIR EXHIBIT

3 Utilities Score with Fair Exhibits

Three utilities, with displays accenting atomic energy and mobile power, recently attracted attention at two state fairs and one trade exhibition.

Wisconsin Utilities Association splashed into the Wisconsin State Fair, Milwaukee, with a three-part exhibit. The two most popular sections—models of two reactors and a mechanized quiz game—are shown above. Scale models reproduced General Electric Co's dual-cycle boiling-water type reactor and Atomic Power Development Associates' breeder type.

Pacific Gas & Electric Co (top right), at the California State Fair in Sacramento, set up an exhibit prepared by American Museum of Atomic Energy. Also on display was a model of GE's boiling-water type reactor designed for Nuclear Power Group of which PG&E is a member.

Commonwealth Edison Co, Chicago, hauled out a 1,000-kw mobile unit (bottom right) for display at General Motors Corp's Powerama show (bottom) on Chicago's lakefront. Three such units supplied power for the 23-acre exhibition. All were built by General Motors.

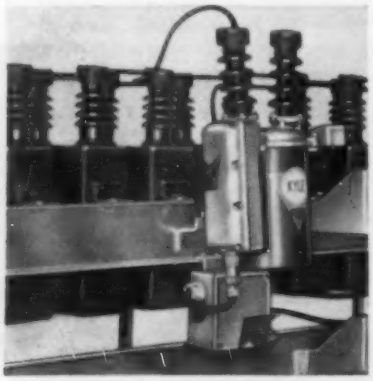
PACIFIC G&E'S REACTOR MODEL, CALIFORNIA FAIR

COMMONWEALTH EDISON'S MOBILE POWER UNIT

THREE MOBILE POWER UNITS, SIMILAR TO ONE ABOVE, SUPPLIED GENERAL MOTORS' POWERAMA SHOW

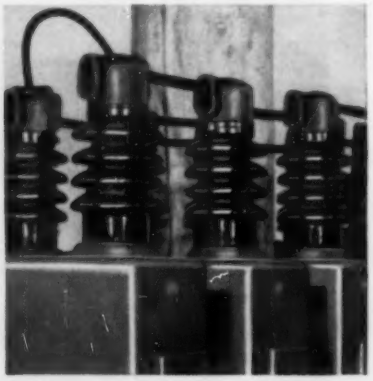
L-M's new single-row switched capacitor rack hugs the pole, provides greater accessibility. Assembly is easier to install, inspect, and maintain.

Junction Box: provides one connection point for control wiring; assures quick, easy installation and maintenance. Also note plug-in connection to switch control box.



Direct Pole Mounting: Only two bolts are required to mount L-M's single-row rack, greatly reducing installation time and pole space requirements.

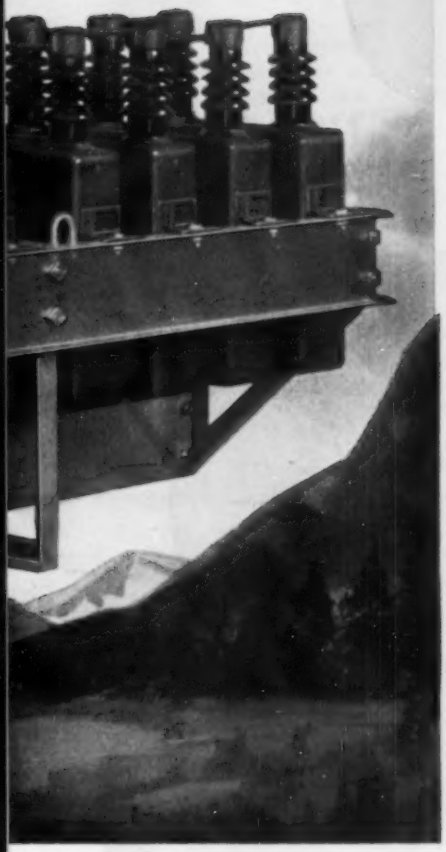
Bird-Proof: an outstanding feature is the bird-proof construction. Neoprene rubber caps cover the terminals, and high-voltage connections are made with 5 kv insulated conductor.



Greater Accessibility, Less Bending Moment...

L-M's New Single-Row Capacitor Rack For Direct Pole Mounting

L-M's factory-assembled and wired, single-row capacitor racks are easier to install, inspect, and maintain. Center of gravity is close to pole, which reduces bending stress on pole.



Dependable Kyle® Switch: racks are supplied with L-M Kyle Type NR Oil Switches, 200 ampere thermal rating and full 150 ampere nominal capacitive rating at 15 kv.

By N. K. DELANEY
Manager of Capacitor Sales
Line Material Company

L-M's outstanding Elemex® capacitors are now available in single-row capacitor racks for direct pole mounting. The racks are factory-assembled and wired, shipped ready for installation on distribution systems rated 2400 to 13,800 volts. Bank sizes may be 225 or 300 kvar.

Single-Row Design

New single-row design provides greater accessibility; assures easier inspection and maintenance of the unit. In addition, L-M's new design brings the center of gravity closer to the pole, and thus reduces the bending stress on the pole.

Direct Pole Mounting

You can reduce installation time and pole space requirements with L-M's direct pole-mounting design. Direct pole mounting eliminates double hanger arm and kick arm. All you do is bolt to pole and connect.

Switched racks are provided with L-M's rugged, dependable, motor-operated "NR" switches. The switches are easily accessible for hook-stick operation. They are equipped with an exclusive plug-in connection for control wiring. This provides a quick, convenient means of disconnecting the switch for servicing.

Get Complete Information

Ask the L-M Field Engineer for complete information about L-M's new single-row capacitor rack and other capacitor equipments, also about L-M's Capacitor Bank Engineering Service. Or write Mr. Delaney, Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Co. Division).

Other Features Of L-M's Single-Row Capacitor Rack Assemblies

- The single-row capacitor rack assembly incorporates many desirable features, assuring greater accessibility, dependable service. These include:
- Only one connection point for control wiring.
- Disconnect plugs on switches; switches can be easily removed for maintenance.
- Interchangeable switch mounting positions to meet various primary circuit configurations.
- Complete bird-proof construction; neoprene rubber caps on terminals, plus 5 kv insulated conductor for high-voltage connections.
- Lifting yoke; makes pole top hoisting easy.

L-M Offers Complete Line of Capacitor Equipments

Factory-assembled single-row or standard three-row racks for pole-mounted banks. Sizes with 15 kv spacing up to 300 kvar switched and 375 kvar unswitched assemblies with 25 kvar units.

Factory-assembled blocks in complete range of NEMA-standard sizes and ratings. Blocks save time and money in assembling large banks.

Metal-enclosed capacitor equipments in all NEMA-standard distribution voltage sizes and ratings.

VDS Method factory-assembled block for large multi-step capacitor banks at transmission voltages, an L-M-exclusive method that reduces cost of switching equipment.

LINE MATERIAL

Elemex® Capacitors

This Manson Tape is still good —after 28 years!

Mr. C. T. Warren, professional Electrical Engineer of Orange, Texas, has always recommended Manson Friction Tape to his maintenance and construction

crews. Recently he sent us two partially used rolls of Manson which have been in his tool box since 1927.

The photo above, of one of the original rolls, shows this result: *the tape, manufactured 28 years ago, still retains its tackiness and most of its original tensile strength.*

Manson Friction Tape is made of a closely woven cotton fabric, into which has been frictioned only new, naturally tacky rubber compounded with the best chemical ingredients. It is mechanically strong...durable and long-lasting...adheres firmly. Manson breaking strength is over 50 pounds per inch of width, compared to the ASTM requirement of 40 pounds.

Used with Okonite and Okolite Rubber Tapes, Manson makes splices that will be tight and waterproof far longer than ordinary tapes. Write for Okonite Splicing Instruction Folder 1089.

...when you splice with:

AVAILABLE THROUGH AUTHORIZED DISTRIBUTORS ONLY

3172

Made by
THE OKONITE COMPANY
PASSAIC NEW JERSEY

SPECIALISTS IN ELECTRICAL WIRES, CABLES AND SPLICING MATERIALS FOR 75 YEARS

SALES AND SERVICE

What's Ahead for Air Conditioning?

SALES
Residential

A fabulous future . . . Sales up 1,000% by '65 . . . Spring-to-Fall retail business . . . $15,000 houses with central air systems

People are still talking about air conditioning, although the football season with its nippish weather is almost here. Things are happening in this relatively young field. New trends are appearing. Utilities will be affected, and commercial and industrial power salesmen—not to mention distributors and dealers—can cash in on the future.

Sales of central residential units will jump nearly 1,000% in the next 10 years, predicts J. H. Gauss, manager of marketing at General Electric's General Purpose Control Dept.

More than 1,000,000 units will be required annually by 1965, he believes. And by that time, central home cooling units will dominate the air conditioning market.

Bigger Business Coming

A growing number of new houses are being equipped with central air conditioning. Gauss thinks that by '65 houses without it, or provisions for it, may be the exception.

Much of the business will turn about five- and six-room houses, he said, which will require two- and three-ton units. But despite this, scarcely a dent will be made in the thriving room cooler market. About 40,000,000 houses built before 1955 will continue to offer a vast market.

Will utilities have to replace power distribution equipment with heavier feeders and line transformers?

Gauss suggests, as one solution, a step-starting accessory unit for the machines. It starts the air conditioner at half power, then seconds later it applies full power. This eliminates light flicker.

Even the room cooler sales pattern is changing. The trend is toward more late summer sales. In 1953, May and June were the peak months. This year things were different.

During recent heat waves, sales ran far ahead of spring and early summer sales. Result: Many distributors and dealers in striken areas were facing late installations.

A Chicago distributor reported a 300% increase in home cooling sales for July over the same month last year. Louisville, afflicted by a record-breaking scorcher last year, was engulfed in blast-furnace heat again this year and sales forged ahead 50% of the 1954 level. Even builders were deciding to put air conditioning into projects already well under way. Fence-sitters were knocked off their perches, and resulting orders carry well into the winter months.

'55 Industry Sales: Up 50%

S. J. Levine, general manager of GE's Home Heating and Cooling Dept, predicts that total industry sales should run 50% better in 1955 than in '54. He sees another 50% increase for 1956. But the gain may be tempered by higher prices. He believes that manufacturers, who have been absorbing increases in labor and materials costs, will soon stiffen prices.

Levine believes that by 1960 the majority of $15,000 houses will be outfitted with summer air conditioning. Some $13,000 houses already are getting it.

GE home cooling sales figures for the first six months of this year point out this surprising fact: Two out of every three central cooling units are going into older homes. The public seems to be regarding air conditioning more and more as it does automatic winter house heating.

Not Costly when Amortized

Home owners are gradually finding that air conditioning is relatively inexpensive when costs are properly amortized. For instance, Levine cites these figures, which were obtained by dividing the initial cost of the product by the number of hours per year it is used:

Product	Owning Cost ($/hr)
Automobile	3.40
Power Lawn Mower	1.42
Central Air Conditioning	0.30

Most people who have consumer products such as a car and power mower can afford $1,000 to $1,500 for air conditioning, Levine believes.

In addition to the residential market, there are many farm applications. F. M. Stewart of Randolph County, Ga., uses two 1-ton units in his colony-type farrowing house.

The average litter is nine pigs per sow. Sows farrow in the spring, and in late summer and fall. But only about six pigs survive the latter farrowings. Heat is blamed. The sows are "nervous and irritable" at farrowingtime. In thrashing around trying to keep cool, they step on more of their pigs. Stewart says if he can raise two more pigs per litter by cooling his farrowing house, the profits of one year will pay for the equipment.

Healthy Manufacturing Outlooks

How are manufacturers reacting to this fabulous air conditioning market? News releases are trickling into magazine and newspaper offices steadily. Here is a typical example:

•

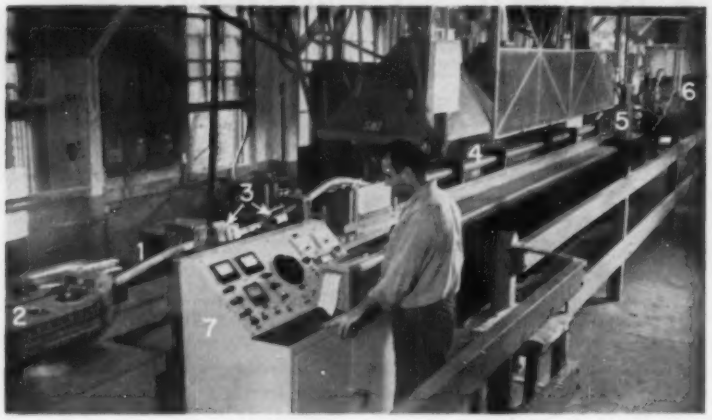
WICHITA, Kans.—A 3½-hp low-cost Vornado central residential air conditioner designed to cool the average three or four bedroom home recently began rolling off production lines of the O. A. Sutton Corp.

Sutton engineers state they have been able to reduce drastically the cost of the central air conditioning units through mass production techniques and by incorporating new engineering principles in its design . . .

•

This reflects optimism. Add to this the fact that an unprecedented U. S. labor force of 65,000,000 people are gainfully employed, according to the Departments of Labor and Commerce. These millions will be earning—and spending—a record national income. So residential air conditioning sales seems assured.

Most people find heat a sticky nuisance. Each hot spell is an excellent salesman for air conditioning. If each summer does its stuff, the air conditioning business for the next 10 years should stay red hot.



Inspection Set-up H-V, R-C Cable Includes:

1. Cable
2. Caterpillar capstan
3. Thickness gauge
4. Ionization tester
5. X-ray machine
6. Take-up reel
7. Control console

Okonite Co Triple Checks Quality of Cable

Three continuous tests provide for improvement in quality of high-voltage rubber-insulated cables manufactured by Okonite Co of Passaic, N. J. The quality-control equipment measures insulation thickness, tests for ionization, and shows the nature of the flaws.

Defects, including tiny voids or bubble-like imperfections smaller than a grain of sand, in rubber insulation can be readily identified and located by the non-destructive tests, states E. D. Youmans, the company's vice president in charge of research and product development.

This inspection equipment consists of three units arranged in series. It is known as the "Gooding Test Train," for F. H. Gooding who is in charge of Okonite's electronic laboratory and who designed and supervised the construction of the test.

Cable to be inspected is passed through all three test units. It is examined continuously in one operation as it unwinds from a reel and is rewound on another reel. Arrangement of all three units is indicated in the illustration, and a brief description of each follows.

First test unit is an insulation thickness uniformity gauge. It is an electronic device which records continuously whether the insulation thickness is correct and uniform throughout the entire length as the cable passes through it. Thin places are readily detected and located.

Second test unit is an ionization or corona level tester. This instrument determines the exact location and magnitude of each imperfection that could cause ionization or low corona level.

The insulated conductor is subjected to a voltage of at least 1.5 times the specified operating voltage as it passes through the test apparatus. Location of defects causing ionization is shown on a continuous recorder, which includes a footage marker.

As one of Okonite's standard practices for almost a year, this test has been made on all rubber-insulated cables produced for service above 4 kv. This rather extensive experience shows the test equipment to be dependable, according to the company's engineers. And now it is possible to locate, and thus eliminate, defects that can lead eventually to failure in service, even though several years might elapse before such trouble would develop.

Third test unit is a 250-kv x-ray machine. It is used to determine the nature of the flaws indicated by the thickness gauge and ionization test units. Such serious faults as broken or damaged conductor strands, improperly applied semiconducting tape under the insulation, and foreign matter in the insulation can be located easily and identified by fluoroscopic examination. They may not be found by other methods.

After the cable has been run through the test train, the defects, if any, are repaired before it is immersed in water for the high-voltage tests. If the nature of the imperfections, or their number, should be serious, the entire length of cable is scrapped.

General Cable to Build Wire Plant in Florida

General Cable Corp will construct a manufacturing plant on a nine-acre site in Tampa, Fla., according to I. T. Bennett, chairman of the Board and J. R. MacDonald, president of the company. This new facility will be the ninth plant to be operated in this country.

Initial unit will be a one-story building of approximately 50,000 sq ft for the manufacture of paper telephone cable and other wires and cables for the increasing requirements of telephone companies operating in the Southeast. Construction of the plant will begin in October and it is expected to be in operation by March, 1956.

"Although the initial unit will be equipped primarily for the manufacture of telephone wires and cables, we are purchasing sufficient land to enable us to construct additional units for the manufacture of wires and cables for the utility, industrial and building markets," MacDonald said.

(*More M&M on page 59*)

Research for New Savings in Power Plant Operations

Steam purity has been advanced to such high levels by B&W equipment that new techniques in measurement have become necessary. In the laboratory, B&W research engineers have pioneered in the use of radioactive isotopes as a precision measuring device.
Re: CLEAN TURBINES

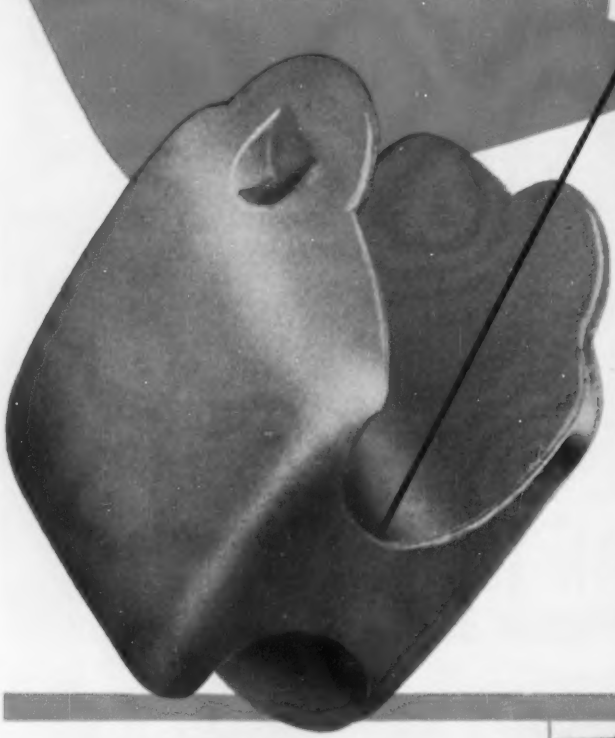
CAN TURBINE DEPOSITS BE REDUCED?

Recognizing that turbine deposits, notably silica, become more troublesome as operating pressures increase, B&W is continuing its intensive research and engineering development efforts toward further improvement in steam purity. These efforts have already produced important practical results, such as maintaining peak turbine efficiency with less frequent turbine outage for cleaning.

B&W Cyclone Steam Separators, steam scrubbers, and the more recently developed B&W Steam Washers—which utilize the principle of silica absorption from steam by intimate contact with condensate or feedwater—afford sound, economical answers to some of the problems of turbine deposits. Already installed in a number of important power boilers, the Steam Washer was developed after intensive B&W study of the mechanics of silica carry-over.

A discussion of "Selective Silica Carry-Over In Steam"—ASME Paper No. 55-SA-19—is available on request. Its findings are characteristic of the advanced, creative work carried on at B&W's large, fully-integrated Research Center in Alliance, Ohio. B&W's research engineers, for example, pioneered the use of radioactive isotopes for the determination of impurities carry-over. And a large part of this comprehensive research program—encompassing not only steam purity but every major obstacle to more efficient combustion and steam generation—has already been reflected in B&W's boiler designs. The Babcock & Wilcox Company, Boiler Division, 161 East 42nd Street, New York 17, N. Y.

The Secret is in the "built-in" Spacer

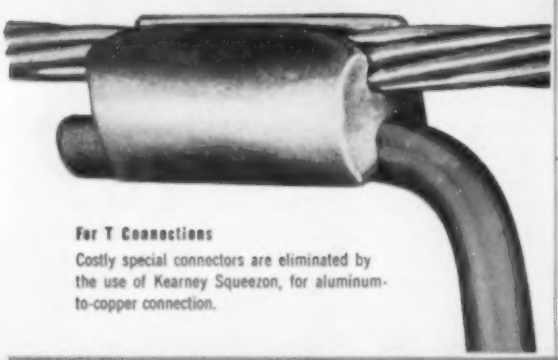


KEARNEY SQUEEZON

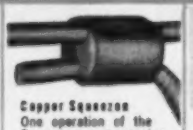
CONNECTORS are designed for greater versatility

The exclusive Kearney design provides the "built-in" spacer. This barrier of metal between the conductors resists galvanic action and, in addition, assures greater conductivity since each conductor is "cold-welded" around its perimeter. Because the wires do not touch each other, there is less danger of flattening or pinching the strands.

KEARNEY SQUEEZON connectors are applied with hydraulic or mechanical tools, in less time . . . at a fraction of the cost of older types of connectors.



For T Connections
Costly special connectors are eliminated by the use of Kearney Squeezon, for aluminum-to-copper connection.



Copper Squeezon
One operation of the Squeezon compression tool permanently bonds this type of joint.

Service Entrance Sleeves
for high-pressure connections of secondary to meter loop.

Dead-Ends
One crimp per Squeezon saves time when multiple connections are used.

Stirrup Tap
Two Squeezons and a short piece of wire make an inexpensive, easy-to-install stirrup, insures a rigid, connection on hot lines.

Aluminum Squeezon
Provides large area contact — prevents cold flow; for aluminum to copper or copper to aluminum.

Line Splice
Line splices are better electrically and mechanically with Kearney sleeves.

For Better Construction . . . Safer Maintenance

JAMES B. KEARNEY CORPORATION ST. LOUIS, MO. GUELPH, ONT.

273

Specify **KEARNEY PRODUCTS** *The Mark of Quality*

JAMES B. KEARNEY CORPORATION • 4224-42 CLAYTON AVENUE, ST. LOUIS 10, MISSOURI • Canadian Plant: GUELPH, ONTARIO

TRANSFORMER COIL and two contactor coils wound with anodized aluminum

'Thick' Al Oxide Insulation Developed by Reynolds

A film of aluminum oxide only 0.0002-in. thick is the basis of a new development for the electrical equipment industry. This anodic coating serves as insulation for aluminum foil or sheet wound spirally into coils. Construction of coils and successful testing of them have been revealed by Reynolds Metals Co, Louisville, Ky.

Reynolds engineers report that the insulation is provided by a special anodizing process, making possible a new system of winding coils for use in transformers, solenoids, and some motors and generators. This method is expected to reduce substantially coil cost, possibly 50% on the basis of equal conductivity and price of copper at 43¢ per lb and aluminum at 24.4¢ per lb for ingots.

In addition to cost, the new method of coil-winding, according to the engineers, offers advantages in reduction of size, weight, and ability to dissipate heat. Some details follow.

- Spiral winding of coils subjects the conductor insulation to turn voltage only and accordingly normal layer insulation can be eliminated. This saving in space, coupled with that derived from the use of the thin anodic film for insulation, accounts for the compactness of the coils.
- Further space savings are afforded by the heat transfer characteristics of the coils. As every turn of the coil is exposed to the outside, no hot spots are encountered and cooling ducts can be eliminated.
- Anodic coating reduces the possibility of a coil's "burning out" because the melting point of the coating is higher than that of aluminum.
- In most cases the aluminum coil weight is approximately one half that of a comparable copper unit.
- Winding process readily lends itself to mechanization and resultant low-cost production methods.

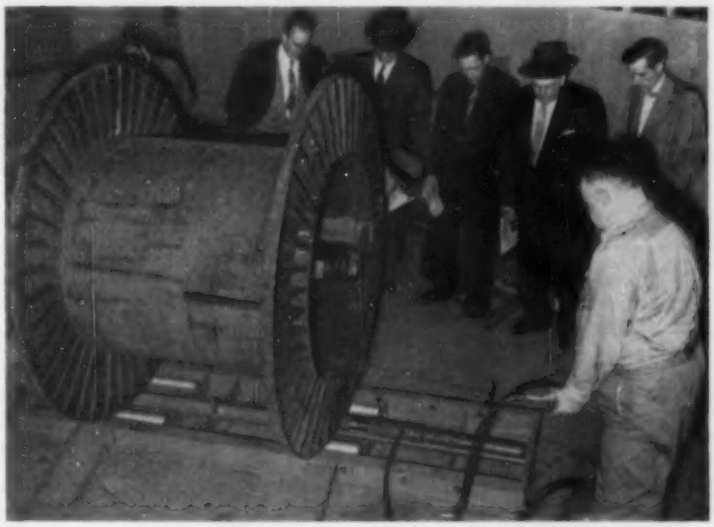
Reynolds has worked with electrical equipment manufacturers in developing the new method of winding coils. An official of one company commented that this development by Reynolds is the first major improvement in the conductor itself.

Reynolds engineers have reported that a coil of anodized aluminum strip conductor can be wound for the same physical space as for a copper coil, based on equal conductivity. This coil for a 10 kva, 480/240-240/120-v, dry-type transformer is shown in the illustration; in addition are shown two small contactor coils wound with bare aluminum foil and polyester film.

Presidential Aid Sought In Copper Crisis

President Eisenhower has been petitioned by representatives of the brass industry to invoke his emergency powers to stave off "the worst crisis in the industry's history." The telegram making the appeal was signed by Herbert Barchoff, president of the Copper and Brass Research Association and the Wire and Cable Section of the National Electrical Manufacturer's Association.

Barchoff pointed out that copper and brass inventories have been "depleted to the vanishing point" by strikes and shutdowns earlier this summer and lately by the floods in Connecticut — the brass mill center. In the midst of these troubles is the spiraling price of copper which has gone from about 30¢ per lb in April, 1955, to the present minimum of 43¢ per lb.



Evans Shows Repair of Steel Reels

The George Evans Corp of Moline, Ill., manufacturer of steel reels used for transporting and storing electrical cables and wire ropes, recently held a cable reel repair demonstration for representatives of large users of steel reels. C. R. Evans, vice president, was in charge of the demonstration.

Steel reels generally consist of two types: Angle spoke (structural type) and pressed-steel (toroidal type). Although Evans Corp manufactures both types, it recommends the latter. These reels are made in flange and diameter sizes ranging from 30 to 90 in. Inside widths are from 12 to 59 in. George L. McCandless, vice president, discussed the economics of steel reels.

At the demonstration, repairs were made such as straightening bent flanges, rounding out flat spots on rims, removing dents from drums, and restoring deformed spokes or flutes. Repairing was done on an Evans fixture.

Illustration shows a bent reel of the toroidal type being forced back into vertical line by a 20-ton ram with an electrically operated hydraulic pump.

BUSINESS OUTLOOK

Electrical World
SEPTEMBER 26, 1955

The outlook, in brief: Business spending for new plants and equipment is moving up again. It's a bright spot in the business outlook. Spending will probably be even higher in 1956, despite curtailment of the fast-tax-write-off program by the Office of Defense Mobilization.

The boom in business spending for expansion and modernization may carry it to a new peak this year. So far the Commerce-SEC Survey of businessmen's plans indicates they will up capital spending 4% over a year ago—to $27.9 billion. But spending in the last half of this year is planned at 17% higher than in the first six months. And final figures may be higher still.

The continuing boom in commercial construction is pushing total capital spending figures up most. Manufacturing companies are not spending as much in 1955 as they spent in 1953, the record year. After commercial buildings, biggest boosts in spending are in transportation, public utilities, machinery, petroleum products and stone, clay and glass.

- Utilities plan to up expenditures 22% in the second half over the first half 1955 ($1.2 billion to $1.5 billion). They'll spend almost as much this year as in the record year, 1953.
- Petroleum refiners plan to spend more this year than they spent in either 1953 or 1954.
- Chemical companies plan to spend less than in the last two years.
- Railroads have revised their plans up from earlier levels. They plan to spend 7% more in 1955 than they did in 1954.

One damper to more new capacity is the Office of Defense Mobilization's recent action in curtailing the fast-tax-write-off program for defense-related expansion programs. ODM has closed 19 and suspended another 38 product classifications, pending further study. Only 20 of 225 areas once eligible for fast-write-off privileges now remain open.

The 19 industry classifications that will no longer qualify are those where government expansion goals are nearly complete. The other 38—those suspended—include primary aluminum, electric power, petroleum, railroads, commercial aircraft, chemicals and a host of other industries.

In all, the freeze affects about $6 billion in proposed plant expansion. Over $31 billion of capital spending had qualified for fast-tax-write-offs from 1950 until the suspension last month.

The curtailment of the ODM program will probably not affect capital spending much over the long run. One offsetting factor is the new depreciation formulas authorized in the 1954 tax law. These formulas offer all industry—not just those with defense impact—rapid depreciation privileges that are almost as attractive as the ODM program.

Also, industry is in a much better position to finance capital expenditures now than when Korea hit. Depreciation reserves of most companies are now much larger. The amount set aside this year will top $14 billion. Then too, profits before taxes are way up. So companies will have plenty of money available to finance new plant and equipment programs. And the Commerce-SEC study indicates that they intend to spend it.

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Your Guide to Aluminum Value

ALCOA ALUMINUM
ELECTRICAL CONDUCTORS
ALUMINUM COMPANY OF AMERICA

*ASQC—Alcoa Statistical Quality Control—a recognized standard of excellence in the aluminum conductor industry.

Every time we break a strand of ACSR (. . . and we do it many times a day, as part of a continuing production check for quality), we're making certain that a strand doesn't break after you put it in service.

But that's only one of many checks we make. The list of tests is unmatched in the industry. It includes:

Metallurgical Specifications—quantometer tests on each pour of rolling ingot.

Uniformity—systematic checks for dimension and surface quality during fabrication.

Conductivity—to assure peak carrying capacity per pound.

Tensile Strength—to safeguard satisfactory service under all operating hazards.

Elongation—to insure adequate ductility.

This Alcoa Statistical Quality Control program is unique, an exclusive service. Detailed test records are on file at each plant.

It's a plus value that costs you nothing more. No wonder independent surveys conducted for the past ten years show Alcoa to be top choice of T & D users.

Your local Alcoa electrical conductor salesman stands ready to give you expert engineering assistance in solving your problems. Call him—or write direct to Aluminum Company of America, 2313-J Alcoa Building, Pittsburgh 19, Pa.

ALWAYS USE ALCOA® ALUMINUM ACCESSORIES WITH ALUMINUM CONDUCTORS!

IN THE INDUSTRY

Mama Is Customer; Customer Is Queen

U. S. women spend most of the money, play major role in the supply-demand picture. Electric companies should cater to them as best customers

Mr Utility Man, what have you done to please Mama today? She is your best and most faithful customer. She controls a big part of your revenue. She's the one who decides whether a new deep freeze, a new dish washer, or a new air conditioner is coming on your lines and when. She's the one who decides whether your rates are reasonable when it comes time to decide on the new model stoves. She's the one who decides whether your service is adequate and your employees are courteous.

Mama's effective advocate in the electric utility industry is J. B. Thomas, the keen-witted Texan who heads the Texas Electric Service Co in Fort Worth. The plain-spoken Thomas might risk displeasing Mama if the stakes are high enough. But his general philosophy is that she is queen and the industry exists and prospers only through her blessings.

Ways to Win Confidence

He believes there are a number of ways that the industry can better serve Mama and win her confidence. He believes it's worth every bit of the effort—in fact that a bright future for the industry depends upon it.

Take meter reading and billing. For the average Mama the meter reader is that fleeting mystery man. Once a month he comes to take a quick glance at the gadget that Mama can't fathom and which measures a commodity that she can't see. The air of mystery is carried still further when the meterman jots down a few notations and darts away. The milkman, who delivers his commodity, is able to figure out his bill, put it down in understandable terms, and leave it personally. But the light bill comes by postcard or envelope from out of space.

Thomas thinks it might please Mama if there were a meter she could read and appreciate. He thinks she might have more confidence in the electric company and the meterman if he were trusted to render a bill on the scene without the hokus pocus of the accounting machinations.

The Texan hints that Mama and the other customers might be more pleased with the electric companies if there were more underground distribution and substations tucked out of sight.

Engineer for Mama

Thomas, who rose from engineering ranks, believes that the utility engineer could profitably spend his time in engineering the system to suit Mama's needs. He thinks the other departments better gear their service to please Mama, too. Sales had best be prepared to see that she gets the kind of electrical servants she wants and that the appliances stay in good running order.

Except for the specific suggestions, there is little brand new in this approach. Utilities as well as other industries have sought in good times and bad to cater to their customers. They've even gone after the women's vote in ad campaigns and in their general planning.

Personalizing the customer as "Mama" is novel. And when J. B. makes his passionate plea on Mama's behalf, there's real sentiment expressed.

There's evidence, too, that he may be on the right track. When he voiced these thoughts in a recent speech before the Rocky Mountain Electrical League, lots of Mamas were present and listened to every word he had to say.

Their remarks afterward indicated the appeal. From them, one might conclude that the bald, aging Texan is "cute," and "sweet," and "interesting" and "right on the beam."

TECHNICAL NOTES

Nuclear power plants in Britain are expected to match production costs of coal-burning plants by 1961. First plant, at Calder Hall, will be gas-cooled and produce marketable plutonium. Scheduled construction of later types is predicted to supplant coal after 1965 and produce 10 to 15 million kw by 1975 to save 40 million tons of coal per year.

Adding third conductor to the bundle will permit present 380-kv system in Sweden to be converted to 500 kv. A four-conductor bundle could operate at 650 kv.

Repair or replacement of damaged splices has been found the cheapest and easiest way to add 50% to the capability of a 200-kv transmission line.

Recorder, newest British cable ship, will service submarine cable at depths up to 3½ miles.

Trees deserving the good conduct medal and their normal heights in feet are: Japanese maple (20), Eastern redbud (36), canaert juniper (20), star magnolia (20), Mugho pine (12), English hawthorn (15), Russian olive (20), watered laburnum (30), Dolga flowering crab (30), purple leaf plum (24), showy mountain ash (30).

Pressures of 3,000 to 4,000 psi will cause metallic whisker growths in seconds to same lengths that require 6 to 8 months at atmospheric pressure. Vacuum of 10^{-6} mm Hg does not deter growth of whiskers. Length of ⅜ in. is not uncommon.

Regulatory Trends Charted

Arthur Andersen & Co issues its updated periodical study of utility commission and court rate decisions going back to 1916

A study has been prepared by Arthur Andersen & Co, containing information of considerable interest to the electric utility industry. It lists every important commission and court decision, with respect to the utility industry, back to 1916. Information, showing the allowable return rate base and general comments, are furnished in each instance.

In the foreward to the book, the following analysis was made:

"A review of recent opinions of state and federal regulatory commissions indicates:

"With respect to rate base . . .

"Commissions in these jurisdictions have explicitly adopted original cost or investment as the rate base:

Alabama	Federal Power Commission
Arkansas	New York
California	Oklahoma
Colorado	Oregon
Connecticut	South Dakota
Florida	Utah
Idaho	Vermont
Louisiana	Virginia
Massachusetts	Washington
Missouri	Wisconsin
New Hampshire	Wyoming
District of Columbia	

"Fair value rate base is required by statute in these states, but the commissions have modified the traditional concept by giving sole or predominant weight to original cost evidence:

Georgia	New Jersey
Kansas	Rhode Island
Kentucky	West Virginia
Minnesota	

"Fair value as defined in Smyth v Ames is still the test of a lawful rate base in these states, although for various reasons original cost or investment has been adopted in a number of decisions:

Delaware	Montana
Illinois	New Mexico
Indiana	North Carolina
Maine	Ohio
Maryland	Pennsylvania
Michigan	

"With respect to rate of return . . .

"Commissions in these jurisdictions have given substantial weight to cost of capital evidence, with particular emphasis on historical cost of debt and preferred stock and current stock earnings-price and dividend-price ratios:

California	New Hampshire
Connecticut	New Jersey
Georgia	New York
Idaho	Pennsylvania
Massachusetts	South Dakota
Michigan	Wyoming
Federal Power Commission	

"Commissions in these jurisdictions have considered, as primary evidence, current earnings requirements based on contractual interest and preferred stock dividend costs and established common stock dividends together with a reasonable increment to surplus:

Alabama	Michigan
Arizona	Montana
Arkansas	Nebraska
California	New Hampshire
Colorado	New York
Delaware	Ohio
Florida	Oklahoma
Hawaii	South Carolina
Idaho	South Dakota
Illinois	Tennessee
Indiana	Texas
Kansas	Utah
Kentucky	Vermont
Maine	Washington
Maryland	West Virginia
Massachusetts	Wisconsin

"Commissions in these jurisdictions have recognized attrition of earnings because of high cost of plant replacements and increasing operating expenses, and have adjusted return allowance through rate base or rate of return:

Alabama	Idaho
Arkansas	Missouri
California	New Hampshire
Colorado	South Carolina
Florida	South Dakota
Georgia	Utah

"Commissions in these jurisdictions have considered risk differentials of type of utility service, geographical location and markets, and size and economic stability of the industry:

Alabama	Federal Power Commission
Arkansas	New Hampshire
California	New Jersey
Connecticut	Utah
Florida	Vermont
Kentucky	Virginia
Michigan	Wyoming
District of Columbia	

"Commissions in these jurisdictions have given substantial weight to evidence of current earnings opportunities in other industries:

California	Maine
Connecticut	New Mexico
Florida	Oregon
Illinois	Pennsylvania
District of Columbia	South Dakota
	Vermont

For copy, write Arthur Anderson & Co, 67 Broad St, New York 4.

FINANCIAL BRIEFS

FPC has granted authorization to Frontier Power Co to buy out its subsidiary, Monument Electric Co, then to sell all Frontier facilities, to Springer Electric Cooperative, Inc, San Isabel Electric Association, and the City of Walsenburg, Colo., for a total of $2 million.

Puget Sound Power & Light Co stockholders at special meeting in Boston Oct. 20 will vote on increasing common stock by 50%. Meanwhile, company has been denied ruling by FPC that it is not a public utility under the Federal Power Act. FPC granted Puget permission to issue $20 million in promissory notes.

Rural Electrification Administration loaned $11,173,000 to Central Iowa Power Cooperative, Cedar Rapids, for a 44,000-kw steam plants and transmission line to be integrated with system of Iowa Electric Light & Power Co. Loan is largest REA has made since 1952.

Private Placement of Securities . . . 50,000 shares of 4.20% series, $100 par, cumulative preferred stock of the Oklahoma Gas & Electric Co through

(Continued on next page)

Financial Briefs

(Continued from previous page)

Merrill Lynch, Pierce, Fenner & Beane; $25 million of first mortgage bonds, 3⅜% series due 1985 of Pensylvania Power & Light Co through Drexel & Co and the First Boston Corp.

Construction Budgets . . . California Electric Power Co will spend an estimated $14 million in 1956 of which $7 million will be spent on a 60,000 kw steam plant to be completed in 1957 . . . Ohio Power Co is slated to spend about $18 million in the next 18 months.

Blyth & Co and Stone & Youngberg, underwriting firms, have been selected by Sacramento Municipal Utility District Pres Royal Miller to serve as SMUD's financial consultants with respect to the proposed $85 million revenue bond issue to finance construction of 200,000-kw Upper American River Project.

Kentucky Coal Merger Seen Stabilizing Prices

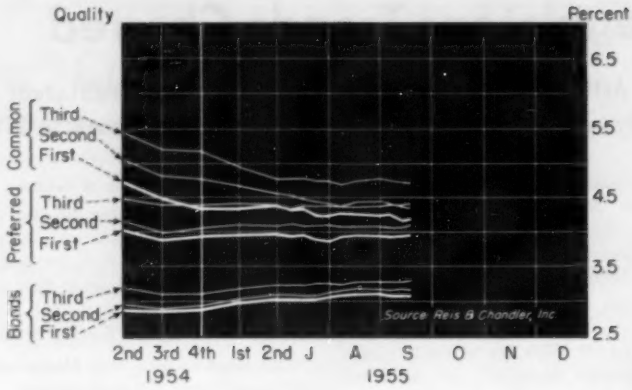
West Kentucky Coal Co has purchased all the stock of Nashville Coal Co for $16 million, according to a joint announcement by Cyrus Eaton, chairman of West Kentucky Coal, and Justin Potter, president of Nashville Coal.

The merged operation will result in a tremendous organization, controlling about 50 to 55% of the coal mined in Western Kentucky. Nashville Coal comprises five large mines, a river transportation system, and various sales offices which annually sell about seven million tons of coal. It is estimated to produce about 30% of Western Kentucky field tonnage while West Kentucky Coal produces about 25%.

Nashville Coal recently signed a 20-year contract with Tampa Electric Co (EW Aug. 29, p 7) to supply 750,000 ton of coal a year for the utility's new Black Point Steam Plant. This marks the first entry of coal into an area which up to now has used oil.

The merger is also expected to see the unionization of Nashville Coal's operations, which were previously non-union. Reportedly, there are close connections between John L. Lewis,, head of the UMW and Eaton.

Today's Utility Yields (%)



	BONDS			PREFERRED STOCKS			COMMON STOCKS		
QUALITY	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
Sept. 15	3.12	3.17	3.30	3.97	4.12	4.39	4.19	4.36	4.70
Sept. 8	3.12	3.18	3.29	3.95	4.09	4.39	4.17	4.37	4.71

Utility Earnings

COMPANY	PERIOD MONTHS ENDED		NET INCOME 1955	NET INCOME 1954	EARNINGS PER COMMON SHARE 1955	EARNINGS PER COMMON SHARE 1954
California-Pacific Utilities	12	July	$666,493	$621,129	$2.20	$2.12
Consumers Power	12	July	27,838,174	26,050,523	3.27(a)	3.18(a)
Gulf States Utilities	12	July	10,105,868	9,363,207	2.03	1.85
Kansas City Power & Light	12	July	7,263,520	6,617,715	2.18(b)	2.17(b)
Pennsylvania Power & Light	12	July	21,848,913	20,304,339	3.05	2.82
Utah Power & Light	12	July	6,556,365	5,172,883	3.21	2.53
Virginia Electric & Power	12	July	18,567,638	14,772,472	2.47(c)	2.08(c)

Notes—(a) Based on average number of shares outstanding; (b) Based on 2,695,000 shares in 1955 and 2,450,000 shares in 1954, and (c) Based on 6,600,000 shares in 1955 and 5,999,980 shares in 1954.

Utility Financing

COMPANY AND DESCRIPTION	AMOUNT OF OFFERING (000)	OFFERING PRICE	YIELD TO PUBLIC / BID DATE
SEPTEMBER 15–20			
BONDS			
Ohio Power—1st mtg 3⅛% due 1985	$17,000	101.039%	3.32%
PREFERRED STOCK			
Ohio Power—60,000 sh 4.20% $100 par	$6,000	$101.20	4.15%
SCHEDULE FOR SEPTEMBER—OCTOBER			
BONDS AND DEBENTURES			BID DATE
Pacific Power & Light—1st mtg due 1985	$10,000	.....	Oct. 4
Public Service Electric & Gas—debs due 1975	35,000	.....	Oct. 4
Worcester County Electric—1st mtg due 1985	8,500	.....	Oct. 18
New York State Electric & Gas—1st mtg due 1985	25,000	.....	Oct. 19
Long Island Lighting—1st mtg due 1985	15,000	.....	Oct. 26
PREFERRED STOCK			
Pacific Power & Light—30,000 sh $100 par	3,000	.....	Oct. 5
COMMON STOCK			
Indianapolis Power & Light—209,685 sh (to be offered commonholders on 1-for-15 basis, record about Oct. 27 to expire Nov. 10)	.....	.....	.....
Southern Co—1,507,303 sh (to be offered commonholders on 1-for-12 basis, record about Nov. 1 to expire Nov. 22)	.....	.....	.....

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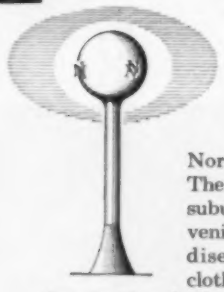
TRANSFORMERS
... the choice of leaders in industry

These metal clad substations are installed in the basement of the Hudson Building for 4800—208Y/120 volt lighting distribution.



world's most power-full shopping center

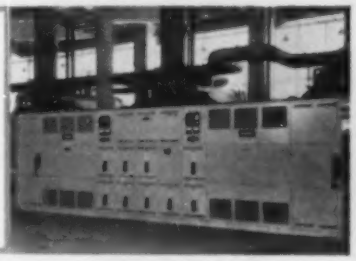
Northland Center development of The J. L. Hudson Company for suburban Detroit, 161 acres of convenience, offers shoppers merchandise and services ranging from clothing to food, furnishings, drugs, dry cleaning, barbering and banking.

The branch department store and some 80 other Northland Center stores are tremendous consumers of electric power. So great is Northland's demand for electricity that the Detroit Edison Company has built a substation there large enough to supply the electrical needs of 25,000 homes.

Eleven double-ended substations, rated from 1000 to 2000 kva, are required to distribute this electric power. Each of these I.T.E. Unit Substations is equipped with two Wagner dry-type transformers.

Wagner Transformers play an important part in supplying power to many major businesses and industries. You'll find them where, as at Northland, only the finest equipment has been installed.

Let a skilled Wagner engineer discuss your transformer needs with you. Call the nearest of our 32 branch offices, or write us.



Unit Substation installed in Utility House for 4800—480 volt power distribution.

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STATISTICS

For New Plant and Equipment . . .

Business Spending Will Hit New High This Winter

Total Business Expenditures for New Plant and Equipment†
billion dollars—seasonally adjusted at annual rates

	1954				1955			
	Jan-Mar	Apr-June	July-Sept	Oct-Dec	Jan-Mar	Apr-June	July-Sept*	Oct-Dec*
Manufacturing	11.62	11.09	10.98	10.58	10.17	10.84	11.36	12.05
Durable	5.40	5.18	5.06	4.80	4.78	5.06	5.48	5.96
Nondurable	6.22	5.90	5.93	5.79	5.39	5.78	5.88	6.09
Mining	.94	1.04	1.00	.91	.80	.94	.93	.92
Railroads	1.04	.91	.80	.68	.74	.80	.98	1.12
Transportation (other than rail)	1.57	1.44	1.51	1.53	1.46	1.62	1.68	1.47
Public utilities	4.33	4.37	4.12	4.01	4.01	4.09	4.64	4.68
Commercial & other**	7.97	8.07	8.42	8.46	8.46	8.90	9.43	9.48
Total	27.46	26.92	26.84	26.18	25.65	27.19	29.03	29.73

† excludes agricultural outlays and spending charged to current account
* estimates based on anticipated expenditures reported by business in late July and August
** includes trade, service, finance, communication and construction

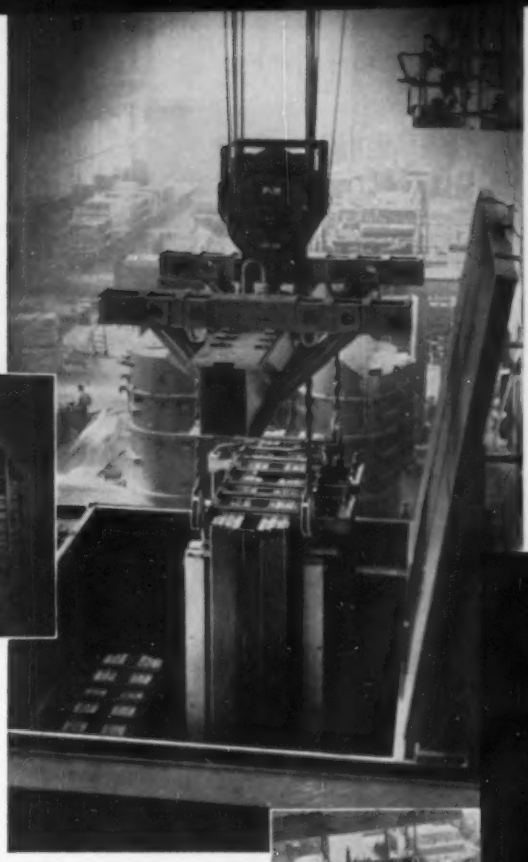
Source: Dep't of Commerce

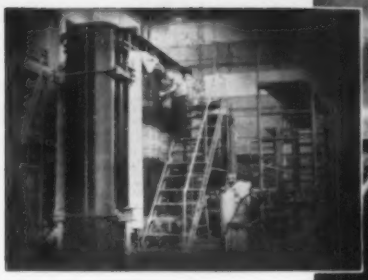
Power Statistics . . .

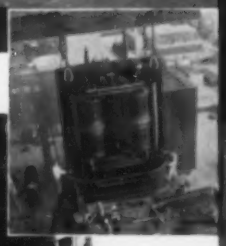
		Latest Month	Preceding Month	Year Ago	Annual Change %
Capacity	July	108.79	107.62	96.98	12.2
Peak—Class I Systems	million kw July	89.3	86.6	78.2	14.2
Estimated Dec. '55 Peak	June	96.6	96.6	96.0	0.7
Production—billion kwhr	July	46.63	44.23	40.12	16.2
Hydro		9.35	9.71	8.75	6.8
Fuel		37.28	34.53	31.38	18.8
Sales—billion kwhr	June	40.17	39.57	34.33	17.0
Residential		9.57	9.71	8.82	8.4
Commercial		6.48	6.18	5.93	9.2
Industrial		21.75	21.35	17.32	25.6
Other		2.38	2.33	2.27	4.9
Fuel Consumption	July				
Coal—million tons		11.72	11.07	9.41	24.5
Oil—million barrels		4.62	4.69	4.44	3.9
Gas—billion cu ft		126.25	107.42	128.30	−1.6
Net Income Class A & B Co's—$ million	July	89.87	96.75	83.84	7.2
Residential Customers—millions	12 mos.	43.74	43.64	42.48	3.0
Revenue per kwhr	ended	2.67¢	2.67¢	2.71¢	−1.5
Avg kwhr per customer	June	2,649	2,637	2,442	8.5
Avg annual bill		$70.73	$70.41	$66.18	6.9

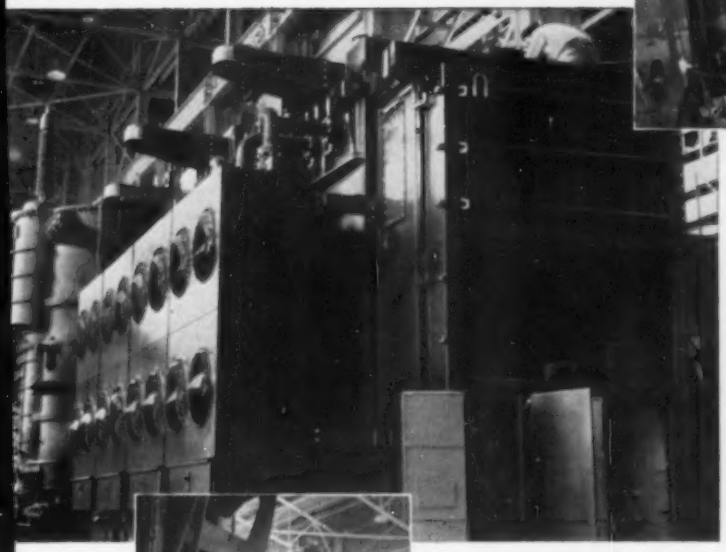
Business Statistics . . .

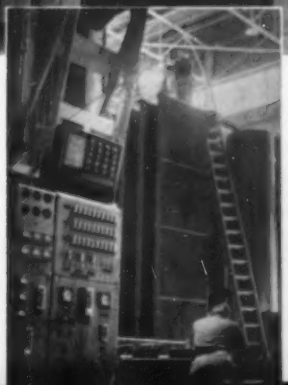
Indexes: 1947–49 = 100					
FRB Industrial Production	July	133	139	116	14.7
ENR Construction Cost	Aug.	141.0	138.4	134.6	4.8
BLS Cost-of-living	July	114.7	114.4	114.3	0.3
NEMA Sales	June				
Insulation materials		158	154	124	27.4
Electric appliances		122	110	102	19.6
Household refrigerators		105	104	82	28.0
Wholesale prices	July				
Motors and generators		121.1	120.8	123.4	−1.9
Transformers and regulators		127.3	127.3	128.1	−0.6
Switchgear and fuses		135.5	135.5	135.1	0.3
GNP—annual rate—$ billion	2nd Qtr.	$385	$375.3	$357.6	7.1











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DEPENDABILITY... STEP BY STEP... FROM PLAN TO PERFORMANCE

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Specify Moloney and you specify . . . Dependability at its best.

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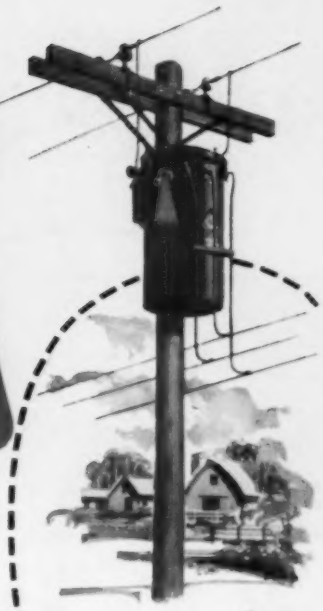
ALLIS-CHALMERS
DISTRIBUTION TRANSFORMERS



"the click does the trick"

Let Low-cost *Thermalite* Indicators Single Out Overloaded Transformers . . . Eliminate Waste of Time and Money Checking Every Unit

YOUR SERVICEMEN CAN SEE from the cab of a truck whether a transformer needs a load check when it is equipped with a *Thermalite* overload indicator. You get continuous, automatic indication of which units need attention without time-consuming load surveys.

Thermalite indicators give advance warning of overloads — in time to make changes without disturbing service continuity. They do not affect transformer operation in any way. The thermal element is located in the top oil, safely away from all live parts. It actuates a bright signal lamp that remains lit till reset by means of a convenient external handle. It does not operate on momentary overloads.

Low-cost *Thermalite* indicators on your transformers let you utilize the inherent overload capability of the distribution transformers on your system. Get them on Allis-Chalmers transformers 100 kva and smaller, 15 kv and below. Write or call your nearby A-C office, or Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin, for more information.

Heart of the *Thermalite* indicator is this snap-acting disc that "clicks" at a predetermined temperature to actuate the signal lamp. Its reliability has been thoroughly proved in millions of applications where thermostatic control is vital — on aircraft, on automotive equipment, and for heating and refrigerating applications.

Thermalite is an Allis-Chalmers trademark.

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